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Antoine Thomas, SJ, and his *Synopsis Mathematica:* biography of a Jesuit mathematical textbook for the China mission*

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To the memory of Björn Löwendahl (1941-2013),
true friend and great connoisseur
of Western books on China

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Abstract: This article is an examination of a nearly forgotten massive two-volume octavo textbook of introductory (theoretical and practical) mathematics published in Douai in 1685, with a second issuing of it in 1729. The theme of mathematical training has been central to the understanding of the Jesuits in China in the late seventeenth and early eighteenth centuries, and this discussion gives a detailed survey of the mathematical 'baggage' of the author, Antoine Thomas, SJ, (1644-1709). Here we consider his teaching at the *Colégio das Artes* in Coimbra, Portugal, in the late 1670s, when he

* I thank Liam Brockey (Michigan State University), Luis Saraiva (University of Lisbon) and Catherine Jami (CNRS, Paris) for their revisions of this text, as well as two anonymous peer reviewers. On the abbreviations used, see the references at the end.

synthesized basic mathematical knowledge. Most importantly, Thomas's *Synopsis* was explicitly written for the use of Jesuit candidates for the China mission, and describes in detail the minimum level of mathematical, and especially astronomical, knowledge and skills that were expected from them. Despite its two issues and its well-targeted didactic program, the book's reception—which spans a period from 1685 until at least 1756, when there is evidence that it was still being recommended—was actually quite limited; this reception can mainly be gauged from the twenty-six extant copies, and some references in auction catalogues. These data reveal a restricted geographic spread, with some notable exceptions, including some copies which made it to South America. Soon after its appearance, the *Synopsis* found a secondary use outside the context of the Jesuit mission to China as a textbook of mathematics. It later enjoyed a reception as a 'collector's item', although it had no further scholarly impact.

"Here we are instructing beginners only"
(Nos hîc solum Tyrones instruimus)
Antoine Thomas, *Synopsis*, vol. I, p. 11.

Among the European Jesuits who worked in China as missionaries, Antoine Thomas (Namur 1644 - Beijing 1709), alumnus of the Gallo-Belgian Province of the Society of Jesus and its colleges,[1] is not considered among the first rank personalities of the mission, such as Matteo Ricci (1552-1610), Adam Schall von Bell (1592-1666) and Ferdinand Verbiest (1623-1688). [2] In recent scholarship he appears rather as a transitional figure between these pioneers and later generations, those men who worked after the 'golden era' of the Kangxi reign period (1662-1722).[3] Indeed, Thomas entered China in 1682 as a skilled observer—after his training in the Gallo-Belgian colleges, his personal study of mathematics[4] and his teaching in Coimbra (1677-1680), to

[1] More precisely those of Namur (1654(?)-1660; 1666-1667), Tournai (1660-1662; 1670-1671), Huy (1668-1670), Douai (1662-1664; 1671-1675) and Lille (1664-1665). Little has been written on the mathematical culture in the Gallo-Belgian Province; for the French colleges see especially De Dainville (1978), pp. 323-354; see also Romano (1999).

[2] Bibl. on Antoine Thomas: Bosmans (1924-1926), Dehergne (1973), pp. 270-271; De Thomaz de Bossierre (1977); Hermans and Parmentier (2017).

[3] Especially Han (2003), pp. 105-114; Jami (2012), pp. 180-213 and Golvers (2014).

[4] On 24 May 1671, he wrote: "In the meantime, on the previous day of S. Xavier, I was internally moved to study mathematics, by which the Chinese are captivated; with the Superior's permission, I accurately learned Euclid's *Elements*, the calculation of the movements of the Sun and Moon and the eclipses of both, and now I am pursuing (the study of) other mathematical sciences." (*Interea, die Sancti Xaverii*

which I will return at length—and his arrival inaugurated a greater degree of professionalism among the Jesuits at the Imperial Bureau of Astronomy (Qintianjian 欽天監). Ferdinand Verbiest, Thomas's immediate predecessor under whom he worked in Beijing at first, had learned the practical aspects of the astronomical 'trade' mainly after his arrival in China. By contrast, Thomas came as an experienced observer. He was recognized as such by his personal acquaintances among the professional milieu in Paris, including Jean-Dominique Cassini (1625-1712) at the Paris Observatory and Jean de Fontaney, SJ, (1643-1710), at the *Collège de Clermont*,[5] and some of his personal observations were reported back in Europe.[6] These facts constitute the backdrop against which his *Synopsis Mathematica*, published in Douai in 1685, should be understood.

Antoine Thomas wrote his *Synopsis Mathematica*[7] as a comprehensive didactic handbook on (almost) all domains and applications of mainly 'mixed,' that is, practical, mathematics, which a missionary in China had to master, preferably *before* leaving Europe. A good mathematical training was indeed a *desideratum* for future candidates for the China mission, and by consequence an important argument to be put forward by applicants, as the *Litterae Indipetae* (Indies-seeking letters) testify. Such aspiring missionaries were Thomas's primary public, as we see in the second part of the complete

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praeterito, motus interius ad mathematicas ediscendas, quibus capiuntur Sinae, Euclidis Elementa, calculum motus solis et lunae et eclipsium utriusque cum Superioris facultate accurate didici, et modo persequor alias matheseos scientias; JapSin. 148, f. 13r.); see further observations on this topic on 27 January 1672 (JapSin. 148, f. 14r.) and on 15 May 1675 (JapSin. 148, f. 16r.).

[5] See Jean de Fontaney's personal testimony on their two meetings, in a letter of 10 January 1687 (JA 49-IV-63, no. 102, f. 86r.-87v.): "I was then in Paris, where I had been teaching mathematics for eight years, and where I met twice R.P. Thomas and was honoured to make his acquaintance."(*J'étois alors à Paris, ou j'enseignois les mathématiques depuis 8 ans, et oi [?] j'ai vi [?] deux fois le Reverend Pere Thomas et eu l'honneur de faire connoissance avec lui*.)

[6] On a series of observations in Coimbra, mentioned in the *Synopsis*, see infra; other observations were published in 1677 in *Journal des Sçavans*; also the anonymous *Breve tratado do cometa que pareceu no mês de Novembre de 1680, o qual tratado fes na cidade de Goa hum Padre da Comp[anh]ia Mathematico estrangeyro que veyo do Reyno* (Coimbra, Biblioteca Geral, Cod. 185, ff. 120-123) should be attributed to Thomas; very convincing is also his '*Epistola ex mari Sinensi*' of 26 June 1682 (AFSI: Brotier 117, 2°). Finally, see Hennequin (2004), pp. 63-101.

[7] Here I should refer to Thomas's manuscript, entitled '*Introductio ad scientias mathematicas*', presently kept by the Hispanic Society of America (New York; shelfmark: MS HC 371/277; it was acquired in 1909; see Hiersemann (1909), no. 327), as part of a series of papers once belonging to the Duchess of Aveiro), it sheds light on the circumstances in which the text was composed and on its arrival in the United States.

title of the book, which can be rendered as *Outline of mathematics, comprising various treatises of this science, laid out briefly and clearly by F. A. Thomas, S.J., for beginners in this field and candidates for the China mission (...)* (hereafter *Synopsis*).[8] This is confirmed in the dedication, which a colleague of Thomas's addressed to Maria de Guadalupe of Lencastre, sixth Duchess of Aveiro (1630-1715),[9] in which the China missionaries are again identified as the book's target audience: "This booklet (sic) [was] written by the author for the benefit of the workers who are preparing themselves for these (Eastern) Missions."[10]

Lastly, this focus on mission candidates emerges occasionally in the text itself when the author, as a good teacher, tailors some of his demonstrations and examples precisely for his particular audience, his pupils in the *Colégio das Artes* in Coimbra with a specific China vocation.[11] The same intention to evoke their future Chinese mission and to draw their attention to the physical reality of China may be also explain the presence of a lengthy chapter (*articulus*) on the Chinese Empire—for obvious reasons still only bookish, relying exclusively on Nicolas Trigault (*De Expeditione Christiana*) and Martino Martini (*Novus Atlas Sinensis*),[12] as well as a reference to Chinese measures and hydraulic projects on the 'river Kiang' (the Yangzi River) in Jiangnan Province.[13] A quite striking detail in his chapter on China is the

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[8] Synopsis Mathematica complectens varios tractatus quos huius scientiae tyronibus et Missionis Sinicae candidatis breviter et clare concinnavit (...). This is evocative of earlier titles, which—I think—does not necessarily imply any influence: cf. Johann Jacob Hainlin's Synopsis Mathematica Praecipuas Totius Matheseos (...) (Tübingen, 1653) and Mersenne's Universae Geometriae Mixtaeque Mathematicae Synopsis (Paris: A. Bertier, 1644). The last part of Kaspar Schott's Cursus Mathematicus (Würzburg, 1661, discussed further), includes a summary entitled 'Synopsis mathematica' (pp. 611-620).

[9] On this remarkable figure, one of the most important sponsors of the Jesuit missions outside Europe, and a prolific correspondent of, among others, Thomas, see Burrus (1965), pp. 19 ff.

[10] 'libellum hunc ab Auctore suo comparandis ad illas missions operariis conscriptum.' See also Thomas's letter of 18 December 1678 (Aveiro (1975), vol. 2, p. 163): "Eas (pars 2 et 3) pro commoditate Hispaniae lubenter absoluissem, et pro Missionariis euntibus ad eos locos, ubi illae artes sunt necessariae."

[11] This Chinese perspective appears, e.g. when, in the chapter on geography, he brings in the distance from Coimbra to Goa, Macao and Beijing, the main destinations of the candidates for the China mission amongst his pupils and readers: Vol. I, p. 232: '*sit Conimbrica & Macaum Sinarum portus nobilis;*' '*Alterum exemplum sit quaerenda distantia Conimbricae & Goae;*'vol. II, p. 265: '*Si enim metiamur iter Conimbricâ Pekinum, quae est metropolis Sinarum.*'

[12] Vol. I, pp. 310-316.

[13] Vol. I, pp. 160 and 397 respectively.

reference to '*Father Ferdinand [Verbiest]*' (I, p. 314), in which Thomas's future working context is heralded.

As a result of this explicit didactic aim, this text offers us the rare opportunity to get a specific idea about *which type* and *what level* of mathematical preparation the China mission candidates were expected to have. Elsewhere, indeed, we only have general indications, as in Verbiest's letter of 1677 to the Jesuit General Giovanni Paolo Oliva (1600-1681), and the xylographically-printed circular letter he addressed 'to his fellow fathers in Europe' (*ad socios Europae*), on 15 August 1678: this speaks of 'some average knowledge of both spheres, i.e. the celestial and the terrestrial spheres' (*utriusque sphaerae mediocrem aliquam notitiam*).[14] In other passages, when describing the profile of a possible successor at the head of the Bureau of Astronomy, Verbiest refers to his expected skills in building instruments and supervising their operation.[15]

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[14] For the Latin text of the former, see Thomas Ignatius Dunyn-Szpot's *Collectanea pro Historia Sinica*, JapSin. 109, II, pp. 120-129; the latter is printed in Josson and Willaert (1938), p. 241: "All those who want to have mathematical disciplines as their companions during their China expedition should in the first place try to take with them speculative (theoretical) as well as practical astronomy, i.e. the theory of planets and eclipses and arithmetic related to them (…). After this, they should apply themselves to becoming familiar with the more pleasant Muses of mathematics, (such as) gnomonics, geodesy, optics, statics and all mechanical (Muses), both speculative (theoretical) and practical ones. Certainly it would be desirable that all… should have at least some average knowledge of both spheres (terrestrial and celestial)."*(Quicumque mathematicas disciplinas in expeditione Sinica sibi comites esse desiderant, imprimis conentur ut astronomiam tam speculativam quam practicam, id est theoriam planetarum et eclipsium, atque eorum calculo assuetam arithmeticam secum afferant […]. Post haec studeant amoeniores mathematicae musas, gnomonicam, geodaesiam, opticam, staticam, et mechanicas omnes tam speculativas quam practicas sibi familiares habere. Certe optandum esset ut omnes…saltem utriusque sphaerae mediocrem aliquam notitiam haberent*.) In addition to this remarkable programmatic statement, another striking aspect of this letter is Verbiest's complaint about the one-sided humanistic, 'sterile' training (the word is in the text: '*tamquam steriles arbores fuisse*' (p. 242)) offered in Jesuit colleges, and about the inferior position of mathematics there, especially when compared to the prestigious position mathematics had in Chinese education according to him.

[15] Cf. Dunyn-Szpot's *Collectanea pro Historia Sinica*, JapSin. 109, II, p; 126: "In addition he should have good practical judgment, in order to be able—if the emperor should propose this—to build engines for public works and to guide—like an architect or what Italians call an 'engineer'—the whole enterprise with success."(*Praeterea bonum habeat iudicium practicum, ut in operibus publicis, Imperatore sic proponente, possit exstruere machinas, et instar architecti aut eius, quem vocant Itali ingeniarii, opus totum feliciter dirigere successu*.)

Thus the *Synopsis* was a well-targeted didactic text. An analysis of the contents will also give more insight into the sources the author exploited, the didactic practice of the Jesuit mathematical professors, if not in general, than in the *Colégio das Artes* in Coimbra, and the reading that he recommends to his pupils.

Finally, there is the question of the extent to which this textbook found an appropriate readership and achieved its goals, namely to raise the average level of the future Jesuit missionaries to China in mathematics, adapted to the necessities of the particular Chinese context and corresponding to the expectations of Jesuits such as Verbiest and his successors. To get an answer to this question, I will investigate this book's reception through testimonies in other sources, and provide a census of the extant copies: their number, geographical and chronological spread, the names of the owners/users, and the physical traces of use they bear perhaps providing an answer to the question of the relevance of the *Synopsis*.

Before proceeding to a detailed analysis of this two-volume text which spans nearly a thousand pages,[16] I should briefly situate its genesis from two perspectives. First, the *tradition* of Jesuit textbooks on mathematics: since the end of the sixteenth century, mathematical instruction within the Society of Jesus was progressively codified in the *Ratio Studiorum* (1599), for which Christophorus Clavius (1538-1612) produced a series of textbooks. To these, distributed throughout the entire Jesuit world (twenty-seven copies of textbooks by Clavius are preserved in China alone,[17] along with many references in contemporary documents), one should add other books that resulted from local initiatives in the various Jesuit Provinces. These include the works of Grégoire de Saint-Vincent (1584-1667) and André Tacquet (1612-1660) in the Flandro-Belgica Province. The latter was also well known in the China mission, where there is evidence of at least twenty copies of his work. In addition, other comprehensive mathematical courses were in circulation—albeit in as yet unknown quantities and geographical spread—in the Jesuit colleges in Europe, such as Kaspar Schott's *Cursus Mathematicus* (first ed. 1661) and Claude François Milliet de Chales's work of the same title (first ed. 1672). There is apparently no link between these and two other titles, published by Mario Bettini, SJ, (1582-1657),[18] and composed with the special

[16] The copy I used is BnF, 8° V 27036/ 1 and 2 (for its provenance, see the Annex, no. 1). The *Synopsis* has twice been the object of systematic analysis: see Bosmans (1924), pp. 170-179, and Jami (2007), pp. 447-468 (esp. pp. 448-451).

[17] See Verhaeren (1949), nos. 1288-1314.

[18] These titles are: (a) *Apiaria Universae Philosophiae Mathematicae (…),* Bologna, 1642 and (b) *Aerarium Philosophiae Mathematicae (…),* Bologna: G.B. Ferroni, 1648. According to the long dedications at the beginning of both publications, they were explicitly written for the benefit of the (Italian) Jesuits in their Chinese mission post, as a substitute for an entire 'mathematical library', which they often lacked there. The

intention of presenting a comprehensive overview to China Jesuits, in the same way as Thomas's *Synopsis*. A more detailed analysis of the sources the latter mentions (see below) will contribute to a more precise positioning of his text, always taking into account its particular point of view, that of a future China missionary and his mathematical preparation before leaving Europe. In this regard Thomas was completely in line with the special concern the Jesuit authorities within China had expressed —such as Verbiest in his 1678 circular letter—about a lack of candidates with the appropriate mathematical education, one intended to match the high standards the Chinese themselves used when evaluating their own personnel.[19] Despite the chronological coincidence between Verbiest's expectations (and frustrations) expressed in these 1677-1678 letters (and their prolongation, the *Astronomia Europaea*),[20] Thomas's undertaking should not be seen as an answer to Verbiest's 1678 appeal, since the first copies of the latter's letter

difference with Thomas's *Synopsis* is that the latter wrote for 'beginners', and Bettini for a readership of professional mathematicians. As the official approvals for Bettini's books date from 1635 and 1641 respectively, the text must have been produced ca. 1630 or shortly later; it is this date which should become the point of departure for a further identification of the context in which Bettini got his idea, and started this gigantic work, all the more remarkable since he was himself not an active mathematician.

[19] In addition to the text quoted in note 14, see another passage of the same letter: "And in the first place astronomy and all the other mathematical disciplines, especially the pleasant ones, such as optics, statics and the entire mechanics, theoretical as well as practical…attracted especially the eyes of the Chinese on them, and they are here (in China) as appreciated as they are under-esteemed in many colleges in Europe."(*At imprimis astronomia et omnes aliae mathematicae disciplinae, praesertim amoeniores illae, ut optica, statica et tota denique mechanica tam speculativa quam practica…Sinensium oculos praecipue in se convertunt, et tanto magis honore hîc afficiuntur quanto minoris in multis Europae collegiis aestimantur.*)

[20] For the 'didactic' purpose as one of the motives behind the *Astronomia Europaea* (Verbiest (1687)), see ch. 13, p. 58 of that work: "Secondly, [I want to] encourage—tacitly, so to speak—those who in the coming years might succeed [us] in our province [of China], to uphold with great care, respect, and love the most beautiful Muses of Mathematics, since it is by their favour that they will gain access more easily to the Emperors and the Princes, and thus will be able to protect the Christian Religion."(*Atque hoc quidem eo consilio facio (…), tum ut eos, qui venturis annis in nostram hanc provinciam aliquando succedent tacite quodammodo exhortemur, ut formosissimas Mathematicae Musas magno cultu, honore & amore prosequantur, quarum scilicet favore faciliorem apud Imperatores et viros principes ingressum inveniant, atque ita in Religionem Christianam tueantur.*)

arrived in Europe in 1680,[21] when Thomas's work was already in its production phase.[22]

Secondly, as a 'European' production, relying on a host of European sources (see below section 3) but explicitly written with the China mission and a Chinese reception in mind, this book is an extremely revealing—because well documented—example of the circulation of knowledge between Europe and China: not only as a vehicle of knowledge (as many European books circulated to China were), but because it was created within this crosscultural context.[23]

[21] This is consistent with the usual speed of the return fleet from Macao (it left Macao in December 1678, arriving in Lisbon in the spring of 1680). The earliest echo of this letter that I have found is in a letter of Eusebio Francisco Kino from Cadix, dated 6 December 1680 (cf. Burrus (1965), p. 122); the first French translation was published in Paris in 1681: *Le Progrèz de la Religion Catholique dans la Chine (…),* Paris, 1681 (Streit (1929) V, no. 2491). For what follows, it is important to know that Jean de Fontaney, the French Jesuit and mathematics teacher at the *Collège de Clermont* (Paris) already mentioned, claimed to be the translator: see his letter of 1 January 1687 to Verbiest, in JA 49-IV-63, no. 102, f. 87v.: "It was I who first had the beautiful letter he wrote to our fathers in Europe in 1678 printed, in Latin and French."(*Cest moy qui ay fait imprimer le premier, en latin et en françois, cette belle lettre qu'elle ecrivit a nos peres d'Europe l'an 1678*.) This does not exclude, however, that the definite initiative to invest money in the production and printing of Thomas's extensive text was taken after reading the urgent appeal contained in Ferdinand Verbiest's letter. Some elements in Thomas's introductory paratext indeed suggest that Thomas had read a first version of Verbiest's astronomical treatise, especially his explicit reference to the group of European Muses grouped together (*stipata*) around Lady Astronomy, which we find at the beginning of Chapter XV of the *Synopsis* (vol. II, p. 339); Verbiest introduces a similar group presentation in his letter of 15 August 1678 to Pope Innocent XI (Josson and Willaert (1938), p. 228); however it is unclear how this text may have arrived in Thomas's hands.

[22] Here I cannot develop in more detail a remarkable parallel with other types of roughly simultaneous textbooks-for-future-missionaries, viz. Verbiest's *Elementa Linguae Tartaricae* (ms. of 1677/8) and the entire *Confucius Sinarum Philosophus* translation project, both intended for applicants for the missions in the (West or East) Indies who wanted to prepare themselves for the China mission before leaving Europe. Put together they seem to point to an organized strategy of putting a set of didactic instruments at their disposal.

[23] See McDermott and Burke (2015); for a description and assessment of book circulation between Europe and China, see Golvers (2012-2015).

1. Genesis of the composition

The idea to compose this volume came to Antoine Thomas when he was still a professor of philosophy at the *Collège d'Anchin* in Douai (1675-1677).[24] He states this in his introduction *('Ad Lectorem')*: "I wrote this mathematical outline upon which I was reflecting before in Belgium, in order to open some easy access to the mathematical sciences."[25] He had already spent much time on the study of mathematics in Douai, with the explicit intention of promoting his chances for being selected for the China mission. Thomas's letters from Tournai dated 25 May 1671 and from Douai dated 27 January 1672 report this, and apparently his intention to compose a textbook was a direct consequence of this engagement. Yet the definite motivation to continue this work was the General's selection of Thomas as a missionary to China (letter of Dec. 1676), and the subsequent decision of the Portuguese Jesuit provincial officer to send him to Coimbra as a teacher of mathematics in the *Colégio das Artes*.[26] This was a logical decision resulting from the periodic shortage of qualified mathematical teachers in Coimbra,[27] and Thomas's proven capacities in the field. He arrived in Coimbra on 25 March 1678, where he succeeded Verbiest (from the Jesuit province of Flandro-Belgica, in Coimbra in 1656-1657), the German Adam Aigenler (1635-1673,

[24] De Thomaz de Bossierre (1977), p. 4, mistakenly mentions the *Collège de Marchiennes*, which was closed in 1667 (Delattre, vol. II (1953), col. 200); on the mathematical instruction in the *Collège d'Anchin* (traditionally called *Collegium Acquicinctinum)*, see Dehon (1988), pp. 95-96 (on Thomas as teacher at *Collège d'Anchin*: pp. 96, 226).

[25] "Hanc scripsi Synopsim Mathematicam, quam antea in Belgio scribere meditabar, ut facilem aliquam viam aperirem ad scientias mathematicas." It seems improbable that the geographic indication 'Belgium' here should refer to the period before 1671, when Thomas left (modern) Belgium (Tournai) and went to present-day France (Douai); therefore, this must be another example of the common seventeenth century use of the name Belgium, which also covers part of Northern France, as in the name of the Jesuit Gallo-Belgica Province. For a confirmation from Thomas's own usage, see Synopsis, vol. II p. 303: 'Proponatur v.g. Conimbrica & Duacum in Belgio, quarum quaeritur distantia.'

[26] Not at the University of Coimbra, as H. Bosmans (1924), p. 170, wrongly reports; on the suspension of the chair of mathematics at the university at this time, see Mauricio (1935).

[27] For the integration of 'foreign' Jesuits in the mathematical courses of the *Colégio das Artes* and the *Colégio de Santo Antão* in Lisbon, see, after Mauricio (1935), especially the lists of Baldini (2004), pp. 293 ff.

from the Jesuit Province of Germania Superior, teaching in 1672-1673), along with other more or less qualified non-Portuguese prospective missionaries.[28]

Thomas's first experience in his new assignment was apparently disillusioning, as he had to conclude from the outset that appropriate, or up-to-date, mathematical books were very rare in the Coimbra area, which would also have included the college library. A similar sentiment was expressed by Ignatius Hartoghvelt (1629-1676), one of Thomas's predecessors from the Low Countries in Coimbra, when he referred—all too laconically—in 1654 to this library as 'bad' (*slecht*).[29] Anyway, a shortage of appropriate books was certainly a serious obstacle for Thomas's continuing mathematical studies and his preparations of the courses:

> I arrived in Coimbra on the 25th of this month (March 1678), and was sent by our Reverend Father Provincial (of the Portuguese Province) to teach mathematics this year. Therefore we will start in a few days, destitute of all support of books, because in this area mathematical books can almost not be found.[30]

This observation is confirmed in another letter of 4 July 1678, in which the author quotes the lack of books well adapted to 'beginners in mathematics' as an argument for producing his own course.[31]

Another—material—characteristic of contemporary manuals for mathematics was the number of (typographical?) errors, which made them often less well adapted to the readers' needs.[32] Precisely for this reason,

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[28] For an overview of several newly identified candidates as teachers within or outside the common curricular mathematical courses, see Golvers (2007), pp. 21-42, and Golvers (2010a).

[29] Ignatius Hartoghvelt, on 23 May 1655 from Coimbra: "this college of Coimbra…has a yearly income of ca. 100,000 guilders, in addition to being richly built, and the church and the library (although it is very bad) have a large yearly income."(*dit collegie van Coimbra (...) omtrent hondert duysent guldens iaers incoomen heeft; boven dat sij rijckelijck volbouwt zijn, ende de kerck, bibliotheek (die nochtans seer slecht is) groote iaerlijkse incoomen hebben*.) (ARA, 3407, f. 1v.)

[30] Aveiro (1975), vol. 2, p. 157: "Perveni Conimbricam vigesimâ quintâ huius, a R[everen]do Patre Provinciali missus ad docendas scientias mathematicas hoc anno. Quare intra paucos dies illas inchoabimus, omni quidem fere librorum subsidio destituti, eo quod in his regionibus vix ulli mathematici libri reperiantur."

[31] Aveiro (1975), vol. 2, p. 151. This reminds one of Ferdinand Verbiest, who reported to Kircher in 1656 from Coimbra (where he was also mathematics teacher) the absence of the latter's books in the library of the same *Colégio*; Golvers (2005), pp. 279-284.

[32] Aveiro (1975), vol. 2, p. 151: "But on the other hand it ordinarily happened that mathematical books—if they were not corrected by the author himself—comprised many errors, which produces much disgust and mistakes among the readers."(*mas*

Thomas preferred to have his book printed not in Madrid, where his patron the Duchess of Aveiro lived at that time, because he would not be able to check the print proofs himself, but rather in Coimbra; he had already solicited the advice of the Rector of the Jesuit college, as well as of the Provincial on this matter.[33]

It is unclear whether this suggests that the manuscript was already nearly finished and could physically be shown as a basis for editorial and financial negotiations, this after only some three months (April, May, June 1678). That only seems possible if we assume the author had already worked on it before he arrived in Portugal. On the other hand, there are some indications, all of which are found in the last chapter (Tract. XV. *De astronomia*), that the author was still working on that section of the manuscript as late as 1680, since it contains references to that year and observations made at that time.[34] Coimbra was certainly a realistic option for the printing of his book because of the presence there of some academic and other printers.[35] Prior to Thomas, Adam Aigenler (1673) already had considered having his *Rota Mathematica* printed in Coimbra, but this does not seem to have been done, as there is no known copy.[36] Neither did this 'opportunity' materialize in the case of

doutra parte aconteceo ordinariamente que, quando os livros mathematicos não são corrigidos pera o mesmo autor, tem grandes faltas, as qual (sic) dão grandes disgostos e enganos aos leitores.)

[33] Aveiro (1975), vol. 2, pp. 157-158.

[34] Cf. Aveiro (1975), vol. 2, p. 298 ('patet ex calculis quod Sol hoc anno 1680 ingrediatur Arietem die 19 Martii'); p. 313 ('hic annus 1680 habet dies 366, id eo prima dies sequentis anni recedit ad duos dies'); p. 500 ('Nodus Boreus Mercurii hoc anno 1680 est in Tauri gr. 14 min. 36…'); p. 520: "Ergo singulis annis accessit ad polum sec. 20 igitur hoc anno 1680 distat stella Polaris a Polo gr. 2 min. 24 sec. 50 iuxta praedictas observationes), always with the demonstrative pronoun 'hic' ('this'), referring to the year of writing. This suggests that the redaction was finished almost in the same month of the same year 1680 as the manuscript of Verbiest's Astronomia Europaea, completed just before March 1680 (see Golvers (2003), pp. 160-162).

[35] On Jesuit printing in Coimbra, see especially De Carvalho (1868).

[36] See his letter to Athanasius Kircher, from Lisbon, 10 March 1673, five years before Thomas's initiative (cf. APUG, 565, f. 95r./v.): "I composed this year an 'Astronomical Wheel', and I would have had it engraved, together with a small explanatory comment, to be printed/published by the Coimbra College, if the Rev. Father Provincial had been able to give the permission for printing; [I also composed] a Grammar of Portuguese, probably for printing in Germany. Both the former and the latter I recommend to Y.R. Father Assistant of Germany, in order to send them to the [Portuguese] Province, etc.." (*Concinnavi hoc anno rotam astronomicam, aerique incidi cum sua elucubratiuncula, edenda typis a Collegio Conimbricensi, si R[everendus] P[ater] Provincialis dare licentiam imprimendi potuisset, necnon Artem Grammaticam Linguae Lusitanae, forte in Germania imprimendam. Et hanc et illam commendo R[everendo] P[atri] Assistenti Germaniae ut eas mittat in Provinciam* etc.)

Thomas, owing to his own problems and the printers' 'lack of time', as we learn from his correspondence (see below).

From all this it appears that the 'incubation period' of this book in its redaction and transcription phase extended from 28 March 1678 to 25 March 1680,[37] that is, two years, mostly during his stay in Coimbra, which he left on 22 January 1680. This apparent prolongation was caused partly by the printers, partly by the transcriber, but also by Thomas himself. He was occupied at the time with his mathematical courses—at least until April 1679[38]—and afterwards with other time-consuming pastoral duties in the Coimbra area, especially in the months from September to December 1679.[39]

Because of the rough simultaneity with Thomas's Coimbra courses, we should look for some signs of interplay between oral teaching and the printed text, at least as far as the public and the contents are concerned.[40] We can recognize such indications in the title of the work itself, which refers to 'beginners in this science' and candidates for the China mission,[41] precisely the two categories that describe those who attended Thomas's courses at the *Colégio das Artes*. These two categories did not completely overlap, as the

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[37] I found this date only in De Thomaz de Bossierre (1977), p. 14.

[38] See his pessimistic remark in his letter of 24 April 1679: "I continue here as a useless servant my mathematical courses, almost without any result, except that I will take some of my pupils here with me [to China]; I devote myself to them in a special way."(*Ego hîc servus inutilis lectiones mathematicas prosequor vix ullo fructu, nisi quod aliquot e discipulis meis mecum sim abducturus, quibus me specialiter impendo.* ARA, Jes., Fl.-Belg., 1162-1170) Among these pupils was José Soares (1656-1736), on whom see below, and Dehergne (1973), p. 256.

[39] JapSin. 148, f. 20r.-21v.

[40] To my knowledge only a few mathematical courses by future Jesuit missionaries in China are preserved: (a) the first (and only) part of the course taught by Wenceslas Pantaleon Kirwitzer (1588-1626) in Graz in 1616, today kept in the *Stiftsarchiv* of St. Paul in Lavansthal (shelfmark: P 5810); (b) some courses of Adam Aigenler (already mentioned above), now in the *Universitätsbibliothek* of Munich, viz. (b1) Cod. Ms. 728. *Astronomia. P[atris] Aigenler Septem Miracula Mundi Siderei sive Tractatus Mathematicus de admirandisPlanetarum Praelectus a P[atre] Adamo Aigenler SJ in celeberrima Electorali Universitate Ingolstadiensi, exceptus a Ferdinando Barbier SJ anno Domini 1670* (63 ff.); (b2) Ms. 729. 4° *Optica Theorico-Practica Variis selectiorum Mathematum Problematis illustrata, dictata a R[everen]do P[atre] Adamo Aigenler SJ Ingolstadii 1666 inchoata 3tio Novembri* (74 pp.). On Aigenler's didactical *rota mathematica*, conceived in Coimbra, see above note 36.

[41] See vol. I, p. 119: "…here (in this book) we are training only beginners." (*...nos hîc solum Tyrones instruimus*); vol. II, p. 159, on the solution of spherical triangles: "practices ….which I drop here as less adapted to beginners."(*Aliae praxes...parum tyronibus accommodatas hîc praetermitto*); see also vol. II, pp. 205, 209.

former may have included lay students,[42] and the latter exclusively consisted of young Jesuits. Both were from the outset shy about starting the study of mathematics, and needed, therefore, to be taught in a didactic way. Thomas's options are echoed in the second part of the title: 'briefly and clearly', and also in the Preface, in which he claims that he gives an orderly exposition and an easy mode of presentation: "Indeed these disciplines mostly use to frighten the beginner at his first approach, if there is not some easy way prepared [for him] to the more difficult demonstrations, which should not immediately fatigue and deter one from one's intentions."[43] Other features occasionally found throughout the text may have had an appropriate didactic intention or reason, matching the elementary level of his public. These include: (a) the examples used for his mathematical proofs, which Thomas takes from the students' immediate context in order to hold their attention and enliven the presentation; such references include the direct topographical environment of Coimbra,[44] with architectural details of the college itself and probably even from the (mathematics) classroom;[45] (b) keeping the written discourse simple, by avoiding the use of too many technical terms, explaining in broad terms instead of writing in a concise

[42] *Tyro (tiro*), a term taken from Classical Latin, characterizes the pupils as 'beginners' in the field; for this—originally military—term, see Gaide (1988), pp. 220-221 (young soldier; recruit; → novice); for Middle-Latin testimonies, see Du Cange (1678), p. 221, s.v.

[43] "Etenim hae artes plerumque terrere solent tyronem in primo aditu, nisi ad difficiliores demonstrationes facilis quaedam via complanetur, quae incipietes non illico fatiget & absterreat a proposito."

[44] See e.g.: 'this city of Coimbra here' ('*Conimbricensis haec civitas*'; vol I, p 184); 'which Nonius admitted here' ('*quem hîc admisit Petrus Nonius*', vol. I, p. 229, referring to the Portuguese mathematician Pedro Nunes (1502-1577), who taught in Coimbra); 'our river Mondego of Coimbra' ('*Mondegus noster fluvius Conimbricensis*', vol. I, p. 340); the hydraulic works which made the Mondego River accessible for ships, to the great commercial profit of Coimbra, are mentioned in vol. I, p. 397, using the Latin name of the river *Monda*.

[45] Vol. II, pp. 394-395: "The examples of these observations are the following ones, made in 1678 in Coimbra in the Jesuit College, to which the church was helpful, which was not yet covered by its vaults."(*Exempla harum observationum sunt haec, facta anno 1678 Conimbricae in Collegio Societatis Jesu, ad quas deserviit templum nondum fornice obductum*). In the treatise on geography (vol. I, pp. 275 ff.), Thomas seems to refer to Spanish maps at hand ('*Mar del Nort*', '*Mar del Sur*'), probably hanging on the walls of the classroom.

way;[46] preferring simple methods to more complicated ones;[47] looking for a certain balance in the presentation, avoiding disgust (*nausea*) on the part of the reader that too heavy a concentration of difficult matters might cause;[48] and finally referring more curious or advanced readers to particular books or authors for more thorough proofs, and further reading.[49] Among these reference books, the *Cursus seu Mundus Mathematicus* by Claude François Milliet de Chales, SJ, (1674) is the most frequently quoted in several treatises,[50] probably because it was widely distributed and a favorite book used by Thomas in his own preparation; (c) the use of mnemotechnical verses (in a dactylic meter) to memorise the positions of the Sun;[51] (d) the

[46] Bosmans mentions the lengthy argumentations, which avoid the use of a too technical vocabulary and the application of more difficult 'rules' or 'formulas', as characteristic of a manual for a public of (semi-)beginners: H. Bosmans (1924), pp. 173-178.

[47] '*facilis methodus*': see, e.g., *Ad Lectorem*; I, p. 407; 409.

[48] See I, p. 429 (in the chapter '*De Musica*', in fact dealing with acoustics): "and, in order to avoid disgust we will touch (only) very few aspects in short."(*atque ad vitandam nauseam paucula breviter attingemus*)

[49] See expressions such as: "Yet for other cases, as well as a more exhaustive demonstration of the next propositions, which will be less adapted to beginners I refer to Book 4 Treatise 5 of Father Dechales's Trigonometry."(*Verum pro aliis casibus, uti &pro sequentium propositionum demonstratione fusiore& minus tyronibus accomodata, vide P[atris] Dechales Trigonometriae l[ibrum] 4 tr[actatum] 5*; vol. II, p. 209).

[50] For a reason still unclear all these references stem from the second volume of the *Synopsis*: see Tract. IX 'De Optica', vol. II, pp. 47, 55 no. 12: both referring to de Chales (1674), vol. 2: *De Dioptricis*; Tract. X 'De Statica', vol. II, p. 71 ref. to *Staticae*, Lib. II; vol. II, p. 93 ref. to *Staticae*, Lib. I, Diagr. 7; vol. II, p. 102: ref. to *Staticae*, Lib. III, prop. 36); vol. II, p. 119, ref. to *Staticae*, Lib. 3, prop. 33 & 34; Tract. XII: '*De triangulorum sphaericorum resolutione*' (vol. II, pp. 205-206 ref. to vol. I, Tract. 3; II, p. 209, ref. to *Trigonometriae*, Lib. V, Tract. 5); Tract. XIII '*De Astrolabiis*' (vol. II, p. 303, ref. to vol. III, Tract. '*De Astrolabio*'); Tract. XV 'De Astronomia' (vol. II, p. 533, ref. to *Astronomiae,* L. 8).

[51] Thomas's explanation is to be found in the Tractatus XIII '*De Astrolabiis*' under the title: '*Quâvis die determinare locum solis in Zodiaco & eius parallellum*' ('How to determine on whatever day the position of the sun in the zodiac, and its parallel'). *Possunt hi alii versus eosdem dies ingressûs Solis in signa indicare: qui in honorem D(ivi) Xaverii, novi Solis Indiam illustrantis conscripti sunt* ('These following other verses can indicate the same days of the Sun's entrance in the signs (of the Zodiac); these verses were written in honor of Saint Xavier, the 'New Sun who lights (East) India'):

"Great praise is thrown into the Indian countries; garrulous heresy/
trembles; the trembling people of the Ganges give thanks"
(Inclita laus Indis immititur; haeresis horret
Garrula: gens Gangis gratos gratatur horre[n]s)

appended illustrations, although these are small size and simply drawn, close approximations I assume to blackboard diagrams;[52] (e) finally, the format of the printed *Synopsis*, an octavo volume. This format is a far less prestigious format than the Jesuits usually asked for their books destined for China,[53] but it fitted in very well with the expected circulation among young Jesuit novices, either in Europe, or on their way to or in China, as it was of a convenient size for flexible use and did not pose particular storage problems.

There was probably one difference between Thomas's oral teaching and the printed *Synopsis*: the language. It seems improbable that Thomas taught his classes in Latin, as acquaintance with Latin in this Portuguese college was considered rather poor and the language was not used frequently, at least according to the testimony of Ignatius Hartoghvelt, some twenty years

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Note that this verse has 12 words, which correspond to the months of the year: the first to January, the second to February, etc. Count where in the alphabet the first letter of the word is, and subtract that number from 30; the rest will indicate the day of the month when the Sun enters the new Sign. For instance: the 1st word ('*Inclita*') stands for the 1st month January. Here 'I' represents the ninth letter of the alphabet; 30 - 9 = 21, indicating the day the Sun enters the new sign. Etc." (*Nota in his versibus esse 12 vocabula, quae singulis mensibus anni respondent: primum Januario, secundum Februario, etc. Numera quota sit in Alphabeto littera, a qua incipit vocabulum, & eum numerum aufer ex 30, residuus erit dies mensis, quo Sol ingreditur novum Signum, v.g. 'Inclita' habet I pro prima littera, ea sit Alphabetae nona: aufer ergo 9 ex 30, residuum est 21, qui dies est Ianuarii, quo Sol ingreditur novum signum, scilicet Amphoram. Etc.*) The first version of this couplet stems from Clavius (*Novi Calendarii Romani Apologia*, Rome, 1598, p. 395) and was imitated by Jean Voel (1608), Léon de Saint-Jean, O.Carm. (1657), Johann Praetorius (1682) and Jacques Ozanam (1694); the application to the Indies and Saint Xavier seems to be Thomas's original contribution. This use of verses as a mnemotechnical support is also attested, for instance, in the teaching at the *Collège de Clermont* in Paris, in the field of geography; Dupont-Ferrier (1921), pp. 152-153.

[52] They display the same stylistic characteristics as the geometrical diagrams on the *azulejos* of the mathematics class at the Coimbra *Colégio das Artes,* dating back to the early eighteenth century; see Leitão (2007b), Leitão and Gessner (2014). The correspondence between these two examples, from the same place (the *Colégio das Artes* in Coimbra) at an interval of forty to fifty years could reflect the same 'Jesuit way' of mathematical teaching and didactic presentation.

[53] Other comprehensive books for Jesuits, and/or to be used in the China mission were in-folio size, such as Kaspar Schott's *Cursus Mathematicus*, produced shortly before the aforementioned volume of Mario Bettini, *Apiaria*, and both conceived of as serving as a substitute for a whole library ('*biblioteca in uno libro*'). For the 'sociological' interpretation of the octavo and quarto-volumes, see A. Petrucci (1979), pp. 139-156.

earlier.[54] Thomas, on the other hand, claimed that he quickly became able to present and preach in Portuguese.[55] Yet his preference for Latin for the printed course followed contemporary linguistic practice within the Society of Jesus and was the rule in the field of mathematics.[56] In addition, it strongly suggests that his target audience went beyond the particular public of Coimbra: his course indeed aimed at all the potential candidates for the China Mission of all Jesuit colleges of Europe, where Latin was the *lingua franca*. This answers Verbiest's general appeal addressed by his circular letter of 15 August 1678 to all Jesuit colleges throughout Europe, for new vocations.

2. The contents

When it comes to the contents of the *Synopsis*, it is clear that the author's intention was to present a comprehensive overview of the entire field of mathematics. This overview was not envisioned as a concatenation of fifteen separate treatises, but as an organic whole. This intention emerges from the internal cross-references between treatises, and from the 'abstracts' for each treatise, which were written after the book as a whole had been constructed and the subdivision into two volumes decided.[57] In fact, the entire volume was conceived of as a step-by-step preparation for Treatise 15, devoted to astronomy, the last and most important of all mathematical sciences—of itself and with the China mission in mind.[58]

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[54] ARA, 3407, p. 15: "They preach only once a year in the Refectory, in Portuguese (because they are not acquainted with speaking Latin)." (*Alleen ééns sjaers preeken sij in het Portugiesche inde refter (want van Latijn en weten sij niet te spreeken)*).

[55] *Jesuit Missions in Japan* (1975), pp. 225-226 (19 September 1678): "When I will return from my 'mission', which I will start one of these days in the direction of the sea [i.e. the Atlantic coast], [preaching in] Portuguese which I speak sufficiently well, enough to give small exhortations and doctrinal explanations."(*Ubi rediero ex missione, quam his diebus incipiam versus mare, linguâ Lusitanâ utcumque // iam loquens sufficienter ad parvas exhortationes et doctrinas faciendas*…)

[56] Compare to the figures in Harris (1988), pp. 149-150; Waquet (1998), pp. 104; 113-114.

[57] See vol. I, p. 429, in the introduction to the treatise on music, the last one in the first volume: "We finish here the first part of the Synopsis with a treatise on Music."(*Claudimus hanc priorem Synopseos partem tractatu ad Musicam* …)

[58] Vol. II, p. 339: "According to the judgment of all centuries and peoples, astronomy is the main part of mathematics (…) But nothing recommends this science as highly as the unexpected access [it offers] to the very vast Chinese Empire, which was from time immemorial impervious to foreign people."(*Haec (i.e. Astronomia) est omnium saeculorum ac nationum iudicio praecipua pars matheseos* **(...)**. *Sed nihil aeque*

In accordance with its general aims, (almost) all mathematical disciplines are reviewed, from pure and basic arithmetic and geometry, onto more sophisticated 'mixed' (or 'practical') mathematics, to astronomy. Not only is the Treatise on Astronomy the final treatise and the 'end' of the entire work, but it is also by far the most voluminous, its 255 pages constituting a small monograph on its own. Bosmans has demonstrated convincingly that it is also the most elaborate one.[59] As such, all the other sciences are reduced to auxiliary sciences, or preliminary stages leading to the study of astronomy; this affinity with astronomy is particularly emphasized in chapters 11 to 14, which deal respectively with sundials, spherical trigonometry, astrolabes and the calendar.

This central position of astronomy in Thomas's text obviously deviates from the classification of the sciences then common in Europe, while it is consistent with Verbiest's presentation of *Astronomia* as the most important of all European Muses in China, the 'Queen' which leads the other Mathematical Muses as her maids of honor.[60]

sublimem hanc scientiam commendat atque insperatus in vastissimum Sinense Imperium ab omni memoria exteris hominibus impervium aditus (etc.))

[59] Bosmans (1924), p. 178.

[60] On this revealing shift of the common classification—in accordance with the position of astronomy in China—see Standaert (2000).

Table of contents of the *Synopsis Mathematica*

	Treatise title	Pages	English translation
Vol. I			
1.	*De arte numerandi*	1-52	The art of counting
2.	*De geometria elementari*	53-136	Elementary geometry
3.	*De geometria practica*	137-210	Practical geometry
4.	*De sphaera*	211-245	The sphere
5.	*De geographia*	246-326	On geography
6.	*De hydrographia*	327-377	Hydrography[61]
7.	*De aquarum fluxu*	378-428	The flow of water[62]
8.	*De musica*	429-465	Music
	Tabula Sinuum, Tangentium, Secantium ad Radium 1000 per dena graduum minuta	466-474	Table of sines, tangents, secants for every 10 minutes of arc to a radius of 1000
	Index Praecipuarum Rerum	Not pag.	Index of the main topics
		Not.pag.	Diagrams
Vol. II			
		Not pag.	Diagrams
	Index Praecipuarum Rerum	Not pag.	Index of the main topics
9.	*De optica*	1-66	Optics
10.	*De statica*	6-149	Statics
11.	*De delineandis horologiis sciotericis*	150-204	Drawing (sun-, moon-, star-) dials.
12.	*De triangulorum sphaericorum resolutione*	205-258	Solution of spherical triangles
13.	*De astrolabiis*	259-303	Astrolabes
14.	*De Kalendario*	304-338	Calendar
15.	*De astronomia*	339-594	Astronomy

[61] In keeping with contemporary terminology, this chapter contains a description of the world's seas, including tides (pp. 337 ff.), Chinese harbors (pp. 351 ff.), and the '*carreira das Indias*' (pp. 356 ff.). From these and some other indications it appears that China was Thomas's mental horizon during his lectures and the process of composing this book.

[62] In fact on hydrostatics.

When speaking of astronomy, one wonders what Thomas's opinion on Copernicus, and on the 'Copernican hypothesis' was.[63] In a didactic work aimed at a general diffusion in Jesuit schools, the official line is to be expected. Thomas indeed explains the juxtaposition of the three systems (Ptolemaic, Copernican and Tychonian), and analyses the arguments for and against the Copernican system, that is, the two Biblical ones, the 'philosophical' one, and the physical and the mathematical ones. Some of these are not conclusive (such as the philosophical and mathematical ones), but both the Biblical and the physical arguments definitely speak against the Copernicans.[64] Thomas states therefore, not surprisingly: "From this I conclude that, because the Ptolemaic system is already convincingly proved to be in error, and the Copernican one seems to contradict many passages in the Holy Bible and it is therefore forbidden to all Catholics to follow it, we hence should adhere to the Tychonian system, which I am following in this Synopsis."[65] His rejection is repeated in the next paragraph: 'Copernicus's opinion rejected' (*Reijicitur sententia Copernici*).[66]

The mathematical program embodied in the two volumes is rather unbalanced and incomplete. It omits some parts of (pure and practical) mathematics, such as algebra—probably because this was not part of the regular curriculum in Jesuit instruction—[67] pneumatics and meteorology. It is not entirely clear whether the different levels of elaboration of the chapters may be due to the unequal competencies of the author, or to the circumstances in which he worked on the various parts over a period of two years, with many interruptions and in haste, so as to complete his entire

[63] '*Hypothesis Copernicana*' (see also vol. II, pp. 490, 508-509, etc.) was the common way of referring to Copernicus's astronomical ideas in contemporary sources. It can already be found in one of Johannes Schreck Terrentius's letters to Johannes Faber (6 April 1616: "I wonder why Mr. Galilei stresses so much the movement of the Earth; was it not enough to say this is an hypothesis to support astronomical calculation, whatever the truth on this point may be." (*miror D(ominum) Galilaeum urgere tantopere motum terrae; annon satis esset dicere sit hypothesis ad calculum astronomicum iuvandum, quicquid sit de ipsa veritas!?* Rome: Bibl. Corsiniana, Fondo Faber 450, f. 526r./1068). Quite surprisingly, Thomas also speaks also about '*hypothesis Tychoniana*' (vol. II, pp. 497, 498, 499).

[64] Vol. II, pp. 352 ff.

[65] Vol. II, p. 357: "Ex his concludo, cum systema Ptolemaicum iam erroris convincatur, & Copernicanum repugnare videatur multis Scripturae locis ideoque prohibitum sit omnibus Catholicis illud sequi, adhaerendum proinde esse Tychoniano, quod in hac Synopsi sequor."

[66] Vol. II, pp. 354-357.

[67] See Jami (2012), p. 201.

outline before leaving Lisbon. The latter point is used by the author as an explanation and apology.[68]

A reading of these two volumes shows that this book—written by a Jesuit who was nearly thirty-five years old—is the quintessence of his personal experience. It embodies the skills accumulated by the author as a partly self-taught mathematician—who acquired much through private study—and as a former teacher of philosophy in Douai and of mathematics in Coimbra, on the verge of his mission to China.

In addition to the references to the geographical settings of his youth in today's Southern Belgium and the adjacent part of Northern France,[69] there are more substantial references to his mathematical and scholarly experience and reflections of his readings. Since both are the basis of his *Synopsis*, I will deal with them in more detail.

These include first his philosophical courses in Douai, when he commented on Aristotle's *De Caelo*, the text prescribed in the *Ratio Studiorum* as part of the curriculum of the second year of philosophy.[70] During these courses he transmitted the observations and opinions on the sun and the moon of Athanasius Kircher, SJ, (1602-1680) and Francisco Rodrigues Cassão (1596-1666), a professor at Coimbra, this despite his own skepticism, afterwards confirmed by personal observations.[71] This short episode clearly

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[68] Cf. preface ('*Ad lectorem*'): "If by chance less felicitous things occur, I pray thee to excuse [this author] for his haste, and to forgive him, as he is preparing himself for the Far Eastern missions, the departure of the fleet being very near."(*Si quid forte identidem occurrerit minus concinnum, properantem quaeso excusa&instante jam navigatione comparanti sese ad Orientales missiones ignosce*.)

[69] Including such Jesuit centers as Mons (*Montes Hannoniae*: vol. I, p. 187), Douai (*Duacum*: vol. I, p. 291; 441-443; vol. II, pp. 303; 311; 349), Lille (*Insulis urbe Flandriae*: vol. I, p. 91) and Valenciennes (*Valencenae*: vol. I, p. 443), while references to Lisbon (vol. I, 346) and especially Coimbra are related to his recent journey to Portugal.

[70] Demoustier *et al.* (1997), p. 127; this seems to be the meaning of the reference in Dehon (1988), p. 193. His teaching was not based on the original Greek text, but on a Latin (abbreviated) edition, probably that of the *Commentarii Collegii Conimbricensis Soc(ietatis) Jesu in Quatuor Libros de Coelo Aristotelis Stagiritae* (1st ed. Lisbon: S. Lopes, 1593), of which several re-issues would follow. This was also the text used in China, as is proven by at least four extant copies, of the 1st, 2nd and 5th editions (Verhaeren (1949), nos. 1361-1364).

[71] Vol. II, pp. 348-349: "On the sun, there could for some people exist a certain doubt whether it is solid or fluid: indeed Athanasius Kircher in his *Ars Magna* (…) Book 1, chapter 1 compares the sun with air boiling in casting furnaces (…). In the same way P. Rodericus Cassanus, the famous astronomer, confirms that he has seen, with an excellent tube, the whole circumference of the sun boiling as if it was boiling water, and how a gigantic flame, with the flying air, was agitated and undulated. Yet their experience brought me to teach the same (opinion) in Douai, in my commentaries on Aristotle's books *On the Heavens*. Yet in turn I learned from my own

reveals the type of scholar Antoine Thomas was: loyal towards commonly accepted 'authorities' in his teaching, but at the same time relying on his own reasoning and experience with excellent instruments.[72] Other (involuntary) observations he made in the same context of the Douai Jesuit College concern the transmission of sound.[73] His feelings of loyalty towards the University of Douai, his *alma mater*, glimmer through the laudatory epithet 'famous' (vol. I, p. 291), whereas in the same context Leuven—the other famous University of the Low Countries and Douai's counterpart—is merely mentioned without comment.

Thomas mentions other astronomical observations made in 1678-1680 in the Jesuit college of Coimbra in chapter 15.[74] Apart from their anecdotic

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experience and reason itself that these observers, although very skilled, were deceived, etc. And I also observed the moon here often with my Belgian telescopes, and I detected that around its edge one could see agitated waves." (*De sole posset esse aliquibus dubium an sit solidus an fluïdus; etenim P(ater) Athanasius Kirkerus in Arte Magna Lucis et Umbrae L[ibro] 1 c[apite] 1 comparat solem cum aere ebulliente in fornacibus fusoriis (...) Item P[?] Rodericius Cassanus insignis astronomus vidisse se testatur excellenti tubo totam solis circumferentiam instar ferventis aquae ebullientem, & quemadmodum ingens flamma, aurâ flante, agitatur et fluctuat. Eorum auctoritas me movit ut idem docerem Duaci in commentario in libros Aristotelis de Caelo. Verum propriâ experientiâ deinceps atque ipsâ ratione didici illos observatores, licet peritissimos deceptos fuisse etc. Et ego lunam crebro tubis Belgicis hîc observans, etiam saepissime deprehendi quod circa eius limbum videantur esse agitati fluctus.*) The Kircher passage is taken from his *Ars Magna* (2nd edition), I, cap. 1 (p. 3). Rodericus Cassanus, characterized as an '*insignis astronomus*' (vol. II, p. 349) is in all likelihood Francisco Rodrigues Cassão (1596-1666), professor of the University of Coimbra, both a prominent mathematician and a medical doctor—not an unusual combination — and the owner of an extensive library of all sciences, which was consulted by Verbiest probably in 1656, when he was in Coimbra. Since Cassão died in 1666, Thomas cannot have been personally acquainted with him; he must have obtained this information about Cassão's observations from Soares Lusitano (1651), Tract. *De Caelo*, n. 34 and 35, where these observations are described at length by a contemporary witness. Cf. Cardoso (1652-1744), vol. 3, p. 396; Barbosa Machado (1752), pp. 241-242; Gomes (1941), pp. 296-297.

[72] In this case the famous '*tubi Belgici*' (telescopes provided with Dutch lenses), the qualities of which Thomas often extolls.

[73] Vol. I, pp. 441-443: on the transmission of the sound of gun explosions in different situations.

[74] Vol. II, pp. 311-313; 394; 398 (twice); 399; 408; 463. These observations of the pole's altitude, made in 1678, were apparently made when the new church building of the Jesuit college was not yet completely finished, and the vaults were not yet built: "*Conimbricae in Collegio Societatis Jesu, ad quas deserviit novum templum nondum fornice obductum*." Some of these observations were mentioned in a note published by the *Académie royale des sciences*: "Longitudes d'Avignon et de Conimbre déterminées sur les observations faites en ces deux lieux de l'Eclipse de Lune du 29 Octobre dernier 1678," *Journal des Sçavans*, 1679: 56-57. Thomas's relations with the Paris milieu go

value, these and some other similar testimonies show in particular the central place of personal observation in Thomas's conception of 'science'. In addition, in chapter 7, he recounts a hydrostatic experiment, carried out in an unspecified year in the Jesuit college of Lille, near Douai, which he had personally witnessed.[75]

3. Reading references

Yet Thomas was not only a 'scientist by experiment'. He also relied on a broad scholarly bookish culture, which emerges in a series of references to the title of books he used, and others which he recommended to his readers. Regardless of the question of whether these books were really to hand during the *Synopsis*'s composition, these references reveal, at the very least, the large extent, variety and composition of Thomas's own reading patrimony. This had several chronological layers.

(1) The oldest one is constituted of a series of ancient authorities, both Greek and Latin: Archimedes (three titles), [76] Galen, [77] Hipparchus, [78] Strabon, [79] Livy, [80] Vitruvius, [81] Pliny the Elder, [82] Ptolemy, *Theophilus astronomus*[83] and—needless to say—Euclid.[84]

(2) In addition, there are some fifteenth and sixteenth century reference authors, such as Regiomontanus (1436-1476), [85] and a small series of

back to his passing through Paris in 1677, where he twice met Jean de Fontaney, at that time professor of mathematics at the *Collège de Clermont* (he taught there between 1676 and 1685 as the successor of Ignace-Gaston Pardies (1670 to 1673) and Claude François de Chales (1673 to 1675)); see above note 5.

[75] Vol. I, p. 391. These observations apparently happened within the framework of the construction of artificial water wells and 'fountains' ('*fontes fieri…fontes limpidissimos constructos esse*'), a department of hydraulics in which Verbiest—and after him Thomas— were also involved in the Beijing area.

[76] *De Circuli Dimensione* (vol. I, 128); *De Sphaer. et Cycl. Prop*. (vol. I, pp. 130 ff., 192); *De Conoidibus & Sphaeroidibus* (vol. I, p. 130); on the '*coclea Archimedis*' (the 'Archimedean screw', vol. I, p. 405).

[77] Vol. I, p. 421.

[78] Vol. II, pp. 305, 341.

[79] Vol. I, p. 281.

[80] Vol. I, p. 284.

[81] Vol. I, p. 250.

[82] Vol. I, p. 281; vol. II, p. 421.

[83] I.e. Theophilus of Edessa (695-785), a Greek astrologer who lived in Mesopotamia.

[84] Var. loc.

[85] Vol. I, p. 250; vol. II, p. 341.

Portuguese authors, all of whom Thomas had probably discovered during his Coimbra period (1678-1680): José da Costa (*De Novo Orbe)*,[86] Balthasar Tellez, [87] Alvaro Nunes, [88] and Pedro Nunes (1502-1578), [89] the famous mathematician who taught in Coimbra and was known outside Portugal.[90] Other sixteenth century authors, astronomers and geographers in particular, include Nicolaus Copernicus (1473-1548), Giambattista Ramusio (1485-1557),[91] Julius Caesar Scaliger (1484-1553),[92] Georg Agricola (1494-1555),[93] Agostino Gallo (1499-1570), [94] Gemma Frisius (1508-1555), [95] Gerardus Mercator (1512-1594),[96] Abraham Ortelius (1527-1598),[97] Juan de Rojas y Sarmiento (dates unknown), [98] Christophorus Clavius, SJ, (1538-1612), [99] Giovanni Botero (1540-1617),[100] Jean Voel, SJ, (1541-1610),[101] Tycho Brahe (1546-1601),[102] Justus Lipsius (1547-1606), Juan Bautista Villalpando (1552-1608), [103] Giovanni Antonio Magini (1555-1617), [104] Antonio de Herrera y Tordesillas (1559-1625)[105] and Johannes Kepler (1571-1630).[106] Most of these

[86] Vol. I, p. 326.

[87] *Historiae Aethiopicae*, l. 1: vol. I, p. 323.

[88] Vol. I, p. 326.

[89] Vol. I, p. 229.

[90] In vol. 1, pp. 229-230, Thomas makes a critical remark on Nonius's measurement of the latitude of Coimbra, due to the use of an 'anulus' that was too small.

[91] Vol. I, p. 326.

[92] Vol. I, p. 330.

[93] Vol. I, p. 159.

[94] Vol. I, p. 152.

[95] Vol. II, p. 261.

[96] Vol. II, p. 281.

[97] Vol. II, p. 281.

[98] Vol. II, p. 261 in the '*Tractatus de astrolabiis*', while Thomas dedicates the entire '*sectio quarta*' (pp. 294 ff.) to De Rojas's astrolabe; all this certainly relies on his reading of De Rojas's *Commentariorum in astrolabium, quod planisphaerium vocant*, Paris, 1550. Thomas calls him '*João de Rojas*' (vol. II, p. 269), and therefore probably made his acquaintance through a Portuguese intermediary, or—as is most probable—in the context of his teaching in Coimbra.

[99] Vol. II, pp. 335, 159, 341.

[100] Vol. I, p. 290.

[101] Vol. II, p. 159.

[102] Vol. I, pp. 249, 250; vol. II, pp. 307, 396-397.

[103] Vol. I, p. 153.

[104] Vol. I, p. 279; vol. II, p. 372.

[105] Vol. I, p. 326.

[106] Vol. I, p. 174; vol. II, p. 523.

names come as no surprise as part of the reading patrimony of a late-seventeenth century Jesuit scholar.

(3) The largest group of his sources are authors of Thomas's early lifetime, from the early and mid-seventeenth century, in alphabetical order: the French Philippe Briet, SJ, (1601-1668) and his *Theatre géographique de l'Europe, contenant la division de ses royaumes et continents* (Paris, 1653);[107] Ismaël Boulliau (1605-1694, mentioned without any title, but in all probability referring to his *Astronomia Philolaica* (1641));[108] Niccolo Cabeo, SJ, (1586-1650) with his book on Aristotle's *Meteorologic*a of 1646;[109] Fr. Francesco Fontana (1580-1656), author of *Observationes Novae Coelestium & Terrestrium Rerum* (Naples, 1646);[110] Libert Froidmont (1587-1653), '*De meteoris*' (vol. I, p. 343), and his commentaries on Aristotle's *Meteorologica* (1627); Galileo Galilei, qualified as '*nobilis mathematicus*' and '*sectator Copernici*' and quoted with a passage from his *Dialogo sopra i due massimi systemi del mondo tolemaico e copernicano* (1632);[111] Pierre Gassendi (1592-1655) and his *Opera Omnia* (1658), including volume 4 and his letter to Godfried Wendelen;[112] Grégoire de Saint-Vincent, SJ, (1584-1667) on the squaring of the circle;[113] Pierre Hérigone (1580-1643), a French mathematician and astronomer who taught mostly in Paris and author of the *Cursus Mathematicus, Novâ, Brevi et Clarâ Methodo Demonstratus* (Paris, 1634-1637; 2n ed. 1644), a 6-vol. compendium on elementary mathematics, apparently used by Thomas, or at least known to him from personal reading;[114] Johann Hevelius (1611-1687), the astronomer from Danzig with an unnamed book, but almost certainly his *Selenographia sive Lunae Descriptio* (Gdansk, 1647);[115] Christian Huygens (1629-1695), the

[107] Vol. I, p. 279; Sommervogel, s.v. Briet, Philippe, col. 157.

[108] Vol. II, p. 371.

[109] Vol. I, p. 330.

[110] Vol. II, p. 496.

[111] Vol. I, p. 53 and vol. II, pp. 354 and 356-357 respectively.

[112] Vol. II, p. 437; Thomas refers to the same letter also in his letter written on 29 June 1682 '*in mari Sinensi*' to Alexandre de Bonmont; cf. infra.

[113] Vol. I, p. 136.

[114] Vol. I, p. 286.

[115] Vol. II, p. 425. In the paragraph on the 'substance, activities, the light and the spots of the moon' (vol. II, pp. 420 ff.), more precisely on the observation of the moon's double movement, Thomas considers as insufficient —on the authority of Riccioli—Hevelius's solution to reduce the moon's movement of libration to some rules: "These movements of its (the moon's) libration have for a long time deceived the efforts and assiduity of many scholars, and although Hevelius has worked with maximal diligence to reduce these movements to some fixed rules, Riccioli finds that these rules of his (Hevelius) do not correspond to the observations of all people; in his *Astronomia Reformata*, he (Riccioli) refrained from determining fixed rules in this matter, being content with the enumeration of many observations, of which various

Dutch mathematician who worked in Paris for a long time with one of his books on Saturn (The Hague, 1656);[116] Athanasius Kircher with three titles, viz. *Ars Magna* (1648), *Magnes* (1641), *Mundus Subterraneus* (1664-1665), and the *Epistola ad Patrem Ricciolium de Altitudine Montium*;[117] Martino Martini, SJ, (1614-1661) and his *Novus Atlas Sinensis* (Amsterdam, 1655, etc.);[118] Adriaan Metius (1571-1635) with a general reference;[119] Claude Morisot (1592-1661), French geographer and his *Orbis Maritimi sive Rerum in Mari et Littoribus Gestarum Generalis Historia*, 1643);[120] the Dutch astronomer Nicolas des Muliers (1554-1630) and his *Tabulae Frisicae* (1611);[121] Giovanni Battista Riccioli, SJ, (1598-1671) with three titles, namely *Astronomia Reformata* (1665), *Geographia Reformata* (1661) and *Almagestum Novum* (1651);[122] Claude Richard, SJ, (1589-1664), mathematical professor at the *Collegio Imperial* in Madrid and, among others, editor of the *Conicorum Libri* of Apollonius of Perga(Antwerp, 1655);[123] Godfried Wendelen (1580-1667), with various observations he made in '*Belgium*',[124] Martin Zeiller (1589-1661), with his travel book on Spain.[125]

(4) The most 'recent' titles and names, however, belong to the decade before A. Thomas left Douai: namely the *Ephemerides Bononienses* (Bologna, 1668) by Jean-Dominique Cassini;[126] André Tacquet, SJ, (1612-1660), the Flemish Jesuit mathematician of Antwerp with *De Arithmetica*, *De Optica* and *De Astronomia*, the last two both included in the *Opera Mathematica,* first published in Antwerp (Meursius) 1669;[127] Nicolas Sanson (1600-1667) with

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disagreed with Hevelius's rules."(*Hi motus librationis diu multorum eluserunt laborem et industriam, et licet Hevelius maximâ diligentiâ laborârit ad reducendos illos ad certas leges, Ricciolius tamen comperit nondum eius praecepta observationibus omnibus respondere, qui in Astronomia Reformata ad terminandis certis praeceptis in hac materia abstinuit, multas observationes proferre contentus, quarum variae ab Hevelii regulis dissident.*) From this fragment one can also conclude that Thomas was not directly acquainted with Hevelius's text, but knew the latter's positions through Riccioli's commentaries. See, among others, Wlodarczyk (2011), pp. 502 ff.

[116] Vol. II, p. 495.

[117] Vol. II, p. 348; I, p. 363, I, pp. 387-388 and I, p. 256 respectively. The '*Epistola Kircheri …de Altitudine Montium*' is discussed by Riccioli (1672), p. 189.

[118] Vol. I, p. 316.

[119] Vol. I, p. 128.

[120] Vol. I, p. 333.

[121] Vol. I, pp. 305, 363.

[122] Vol. II, pp. 367 and 425; vol. I, pp. 233 and 256-257 respectively.

[123] Vol. I, p. 134.

[124] Vol. II, p. 367; 381 and 406.

[125] Vol. I, p. 279.

[126] Vol. II, p. 496 ('Ephemerides Bononienses').

[127] Vol. I, p. 21; vol. II, p. 367 and 369 and vol. II, p. 394 respectively; vol. II, p. 402.

his *Atlas* (Paris, 1669);[128] Michel (le) Séné(s)chal, SJ, (1606-1673)—one of Thomas's teachers in Tournai—who published his *Trias Evangelica* in 1669 in Liège; François de Rougemont, SJ, (1624-1676) with his *Historia Tartaro-Sinica*, printed in Leuven in 1673;[129] Ignace Gaston Pardies, SJ, (1636-1673), the author of *Tabulae Caelestes,* i.e. *Globi Coelestis in Tabulas Planas Redacti* (Paris, 1673*)*;[130] Claude François Milliet de Chales, SJ, (1621-1678), *Cursus seu Mundus Mathematicus* (Paris, 1674), in fact the most recent title in his landscape of readings and citations.[131] In this last layer of reading one senses a strong impact from Paris, evinced by the works of the successive mathematical teachers of the Jesuit College in Paris (Pardies, de Chales) and the printer Nicolas Sanson, which can be traced back to Thomas's visit to Paris and his meetings with Jean de Fontaney; from this and other indications his stay among the scholarly Jesuit community in Paris had greater impact than has previously been recognised.

We can make another revealing observation with regard to Thomas's way of referring to these sources. As a rule, his references appear rather casual, as they are mostly limited to the author's name and book title.[132] As such, he seems to be spontaneously dropping references from his personal reading, and his own background. This has certainly to do with the pedagogical purpose of the *Synopsis*, which was not written for specialists. What is more, in many cases the references are not intended as an indication of source, nor were they inserted as a 'justification' of the author, but they were simply suggestions for further reading for more advanced students. In this respect, de Chales's recently published *Cursus seu Mundus Mathematicus* appears as the latest and most comprehensive book that Thomas suggests to his pupils, present and future. It may also therefore have been a major source for his mathematical studies, perhaps already during his own personal study.[133]

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[128] Vol. I, p. 274 and 323.

[129] As Thomas refers to the Latin title, it was the Leuven edition (Martin Hullegaerde, ante Hallas, 1673); he did not seem to know its Portuguese translation.

[130] Vol. I, 24; vol. II, p. 527.

[131] Cf. varii loci.

[132] The only precise references are to Kepler's *Astronomia Optica* (p. 111, quoted in vol. I, 174); Brahe's *Progymnasmata* (p. 733, quoted in vol. I, p. 249), A. Ortelius, *Theatrum* (fol. 11, quoted in vol. I, 281), and Galilei, *Dialogi* (p. 88, quoted in vol. II, 356-7).

[133] Reminiscences of this reading appear also later in his letters from China, for instance his reference to the Bremen wheel in his letter of 30 May 1688: "Two hydraulic engines in the emperor's villa, built to irrigate a large field. There are two big wheels, in certain respects similar to the famous Bremen wheel." (*duae machinae hydraulicae in villa regia [i.e. in Beijing], erectae ad vastum campum irrigandam. Sunt duae magnae rotae, in quibusdam similes celebri rotae Bremensi*) (JapSin. 148, f. 124v.); he

This preference for de Chales implies a complete silence on another, slightly older, Jesuit mathematical textbook, namely Kaspar Schott's *Cursus Mathematicus* (1661), a voluminous folio. This silence is all the more remarkable as Schott also addresses himself to the same category of mathematical beginners—although he makes no mention of the China mission—and the course was very successful, with three reprints (1674, 1677 and 1699).[134] A probable explanation is that Thomas—living within the French rather than the Habsburg cultural sphere—was first acquainted with de Chales's work, and had largely completed the basic concept of his own *Synopsis* before Schott's work came to his attention.[135]

A last point concerns the question whether the books mentioned here were all to hand in Coimbra while Thomas was working on his draft. From the outset it appears a rather improbable assumption, when we keep in mind the aforementioned testimonies on the shortage of up-to-date and appropriate mathematical books in Coimbra, a period which covers at least 1655-1678, when many of the aforementioned books were published for the first time. This apparent contradiction between the 1678 (repeated) complaint and the relative wealth of book references in the final version of his text of 1680 can be resolved in different ways. One could assume that these titles were acquired in Coimbra during the two years after his arrival, whether for the Jesuit library or—more probably—for his own benefit, or that they represent memories of the books he had seen and assimilated during his Douai stay. Yet more probably he consulted and read these books in Douai and afterwards used the notes he had made from them; this may be also the explanation for the mostly imprecise references, which better fit the assumption that they were made from notes or memory than with the books to hand**.** It could be revealing to check whether these titles are indeed in the library inventory of the Douai *Collège d'Anchin*, which is preserved.[136]

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almost certainly took this information from de Chales (1674), vol. 2. On the Bremen wheel, see Schwarzwälder (2000).

[134] See his '*Synopsis Operis*' § 2: "Because I am writing for beginners and candidates in mathematics, I am levelling the route which is steep and hostile by its spines."(*Ego quia tyronibus scribo, & mathematicae candidatis iter arduum ac spinis obsitum explano*.) For a recent analysis of this work, see Knobloch (2011); for Schott's didactical work, see Vollrath (2007).

[135] The fact that there are only four copies mentioned throughout France (ccfr.bnf.fr), all now in Paris, could suggest the work was not widespread in the country, probably as its function was taken by Hérigone (1634-1639) and then by de Chales (1674). A more systematic study on the diffusion of Schott's (and Kircher's) works through Europe remains to be done.

[136] See Duthilloeil (1846), p. 403 ff. (no. 945); Catalogue Général des manuscrits des bibliothèques publiques des Départements (...), Tome VI. Douai, Paris 1878, no.

4. The publication process

After Thomas's departure from Lisbon and because of the negative assessment of the Coimbra printers, the Duchess of Aveiro—to whom the book had already been dedicated on 4 July 1678[137]—proposed that Baudouin Desruelles, SJ, (1632-1702), Provincial of the Gallo-Belgica Province[138] print the manuscript at her expense. Some four years then passed, during which the necessary printing authorizations were acquired: the permission from the Provincial being dated Cambrai, 11 January 1684. The ultimate dedication of the complete work to the Duchess of Aveiro was signed by one '*P.D.L.C.*' in Douai, 1 February 1685.[139] Thomas underscores once more how deeply the Duchess had been involved in the production of this book, which could be called 'her' book, as he explains in the very first words of his dedication: "This booklet, Excellent Lady, we render rather than offer to thee. Indeed it is thine, not only because it has been published on your costs and with you as procurator, but also because its author is very devoted to you."[140] At any rate we recognize in the background the Duchess's devotion to the China mission and its propagators, but also her interest in China and in mathematics, which her private library also reflects.[141] The first issue was an in-octavo production of the printer (Veuve) Mairesse, who printed under the sign *Salamandre couronnée* (crowned salamander) in the rue des Ecoles in Douai, in 1685. We cannot be more specific than this, although the date of the last dedication to Maria de Guadalupe, 1 February 1685, is a *terminus post quem*.[142] This question is not without importance, as I suppose that at least

1065: 'Inventaire des livres provenant de la bibliothèque des Jésuites de Douai, rédigé conformément au decret du 9 Pluviôse an II; achevé le 15 ventôse an III.'

[137] Aveiro (1975), vol. 2, p. 158. The dedicatory letter in its printed form is dated Lisbon, 25 March 1680, and addressed: '*Mariae Dei Matri Auctori*' ('To Mary, the Mother of God; to the Creator').

[138] PIBA, I, p. 290.

[139] As this undersigning is at the end of a Latin text, the solution for this abbreviation should also be sought for in a Latin syntagm, and a French solution such as '*P[ère] d[e] l[a] C[ompagnie]*' looks less appropriate; in that case, it could hide a name formula, such as '**Pater d[e] l(a) C[.]*'; an overview of the simultaneous *Catalogi* of the Gallo-Belgian province—to which Douai belonged—provided no solution.

[140] Librum hunc, Excellentissima Domina, non tam offerimus Tibi quam reddimus. Tuus siquidem est, non modo quia tuis sumptibus ac te procurante in lucem editus, sed etiam quia longe devinctissimum habes eius auctorem.

[141] Its inventory is in Toledo, Archivo Histórico Nacional, *Sección Nobleza*, OSUNA 173,2 Leg. 173/23. On the composition of the library and an assessment of its contents, see Maillard Alvarez (2011).

[142] The volumes are described as follows: (13 + 1 pp.), 474 pp., 14 pp. and (15 + 1 pp.), 594 pp., with series of 17 and 20 plates respectively: Streit (1929), pp. 909-910;

one copy was taken to China by the French Jesuits who left Brest for China on 5 March 1685 (see below). The publication of the *Synopsis* was not announced, let alone commented upon in any of the current scholarly journals, such as *Acta Eruditorum* (Leipzig) or *Journal des Sçavans* (Paris), which may be due to its didactic rather than specialized character.

Thomas learned that his manuscript was being printed, and, in a letter of 14 November 1685, while already on his way to Beijing, asked the Duchess to send at least one copy to China, to be presented to the emperor.[143] A conspicuous but not unexpected aspect of his request is that the copy destined for the emperor should be decorated—an important element to give Western books more prestige among the Chinese. He also emphasised the illustrations, since these were the only feature of Western books directly accessible to the Chinese readers. We do not know whether such a copy was ever produced, and in what sense it could have been decorated: with gilded elements, and a special cover? If this gift was ever presented, it was one of the rather rare examples of the gift of Western mathematical (or scientific) books intended as a present to the emperor. For the purposes of this study, it has not been possible to check whether some of them still exist in the Palace Museum.

Three years later, in a letter from Beijing dated 4 September 1688 to Alexandre de Bonmont, SJ, (1632-1718), his 'contact person' in Douai, Thomas refers to a copy in his hands in Beijing. Putting this date within the framework of Jesuit journeys to China, and taking into account the timing of travelling within China, it is extremely likely that this first copy (or copies?)

Sommervogel (1896), col. 1977(5). On the Veuve Mairesse, see Barbier (2002), p. 377; Arbour (2003), p. 361; Mellot & Quéval (2004), s.v.

[143] JapSin. 148, f. 99v. (4 Sept. 1688): "One told the Emperor through the aforementioned courtier that, before I left Europe, I had composed some books on mathematics, which probably exist already in a printed version. If so, it would be worth sending a well decorated sample here, to be presented to the Emperor, so that he can see it with his own eyes. Although he does not understand the language, at least he will understand the appended illustrations, and afterwards a short explanation can be translated."(*Significatum fuit Imperatori per aulicum supradictum me in Europa ante discessum aliquos libros mathematicae composuisse, qui forte iam extarent impressi. Si ita sit, erit operae pretium aliquod exemplar bene adornatum huc mittere, Imperatori offerendum, ut propriis oculis videat. Et quamvis non intellegit linguam, saltem figuras adiectas intelliget, ac postmodum brevis verti poterit explicatio.*) For a French translation of this passage, see De Thomaz de Bossierre (1977), p. 36. The plural '*aliquos libros*' refers to the fifteen treatises of which the Synopsis consists, and several aspects in this passage prove that Thomas had not yet seen a copy of the very recently printed book. The 'aforementioned courtier' is in all probability Zhaochang 趙昌, the 'Tchao yao le' mentioned in many contemporary Jesuit letters from the court: he was acquainted with algebra and Thomas's algebraic and mathematical work since 1690. See Jami (2007), p. 459.

was brought to China by the five French Jesuits who left Brest on 5 March 1685—i.e. one month after the permission was signed—and who arrived in Ningbo 寧波 on 23 July 1687 and in Beijing on 7 February 1688.[144] On the basis of this copy, Thomas prepared a Chinese translation for his lectures: "I thank Your Reverence for the work invested in the printing of the Outline (Synopsis), which succeeded in a felicitous way, and it does not miss its effect here. I am translating it into Chinese, and it serves for giving lectures, which they know I have taken from my own printed book."[145] Thomas's last reference to his *Synopsis* appears to date from 12 September 1697, and is again to be found in a letter to de Bonmont, in which he complains about the typographical errors:

> (...) If by any chance the Synopsis would be reprinted, as many desire (...) I ask Y.R. to revise it completely and to purge from it some errors, which for want of time I cannot list, and to deign to complete it with some useful (topics) omitted. It is indeed very useful in this (part of) the Orient.[146]

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[144] The best description of this journey is given by Landry-Deron (2001).

[145] "Gratias ago R[everenti]ae V[estr]ae de opera impensâ in impressione Synopsis, quae feliciter successit, nec suo hîc [i.e. in Beijing] caruit fructu. Eam Sinice verto, servitque tradendis lectionibus, quas sciunt a me depromi ex proprio libro impresso, etc." Letter (in fact a contemporary copy) formerly at the Bibliothèque Ste Geneviève, Paris, then at the Jesuit College of Canterbury, then in the Jesuit collections in Chantilly, and presently at AFSI, Brotier 117: Missions de Chine, Lettre du P. Antoine Thomas (1682-1688). As for the teaching, from the context it is clear it was Chinese students he has in mind, certainly in continuation of Verbiest's curricular teaching in the Bureau of Astronomy, on which we have only very little information. Prince Yinzhi 胤祉, the third son of the Kangxi emperor, was among his 'private' students.

[146] ARA, 3398, ff. 126-130: "(...) quodsi forte rursum imprimeretur Synopsis, quam multi desiderant … rogo R(everentiam) Vestram ut totam sedulo revisat et expurget a nonnullis erroribus quos mittere mihi non vacat, eamque dignetur etiam augere quibusdam utilibus praetermissis. Servit enim multum in hoc Oriente." The uninterrupted contacts with Alexandre de Bonmont in Douai, even after Thomas had arrived in Beijing and became Verbiest's assistant and then his (temporary) successor after the latter's death, emerges not only from a small series of letters, but also from some copies of the 1684 calendars produced by Verbiest, which Thomas sent to the library of the Jesuit college of Douai with a handwritten dedication in the dative case ('Bibliothecae Duacensi Soc[ieta]tis Jesu': see Golvers (2003), items KH 19c2, (p. 471) now in the University of Kansas, and KH 23 (pp. 476-477), now in Indiana University). These contacts certainly went through Batavia, Amsterdam and the Plantin Press (MPM) in Antwerp, as is proven, among other things, by some letters from Thomas to the printer Balthasar III Moretus (1646-1696) and some other

This assertion at least proves that he used his text intensively in China, for his own teaching (to the emperor, the officials or students (*tianwensheng* 天文生) of the Bureau of Astronomy, and later also to some fellow fathers),[147] and for the announced translation. This translation or 'brief explanation' (*brevis (...) explicatio*)—as announced in the letter of 14 November 1685—has been thoroughly analyzed by Catherine Jami, and need not be repeated here.[148]

Thomas also suggests that he was expecting a (corrected and completed) reprint ('*Si forte rursus imprimeretur*'). When the book was finally issued again, in 1729, again in Douai, it was not a reprint, but a reissue with an unchanged title and text by the Derbaix printing house. The question arises as to the circumstances which may have brought about this re-issue. One could assume that the interest in the topic—basic mathematics, and probably also the China mission perspective—was still lively, and the original target public was still present. Interest in the China mission in the French and Gallo-Belgian Province was still significant in the early eighteenth century, as a glance through the files of extant (and precisely dated) *Litterae Indipetae* of these Provinces through 1728 confirms. This interest was further fuelled by popular and widely distributed publications, such as the *Lettres édifiantes et curieuses (*1703-1776), to mention only one example. Personal accounts of some China missionaries from the region was also probably encouraging; one of them may have been François Noël, SJ, (1651-1729) who lived in the Lille Jesuit college from 1717 until his death.[149] But the explanation should probably also be found in local, commercial circumstances. Based on material comparisons (paper, paper mill, page layout, etc) and an overview of the production of the Mairesse and Derbaix printing houses in historical perspective, it becomes evident that, when the *Veuve Mairesse* died in 1729, the house, the name (*sub Signo Salamandri*) and the stock of unsold (and likely

documents kept in the MPM archives referring to de Bonmont (MPM M 30). The 'star witness' here is a letter with a geodesic question Verbiest sent to Antoine Thomas when the latter was in Macao, which he forwarded to de Bonmont in Douai via Antwerp, where the only extant copy—a contemporary transcription—is preserved; see Golvers (2000), pp. 86-102.

[147] I refer to Kaspar Castner and Luis Gonzaga, who arrived in 1708 in Beijing: on this instruction, see Thomas's letter of 5 October 1708 in JapSin. 149, ff. 460-1.

[148] See Jami (2012), pp. 180-213.

[149] On François Noël in Lille, see P. Delattre, vol. 2 (1953) col. 1291-1292. From his stay may stem some materials once in the Lille Jesuit college and scattered after the Suppression of the Society of Jesus in 1773 (hereafter 'Suppression'), such as the hand drawn *Atlas Sinicus ('Collegii Soc[ietatis] Jesu Insulis; Donum P[atris] Franc[isci] Noël Mission[is] Sinici')*, the manuscript of his translation of the Confucian Classics, and his manuscript of the *Observationes Mathematicae*, etc. (all three now in Brussels, KBR, Section Mss. and Precious Works: see Dudink (2006), passim).

unbound) copies was taken over by Charles Louis Derbaix, her son-in-law and former commercial partner, who produced only a new title page with his name on it. Therefore this re-issue is not very probative for the success of Thomas's book as such, as it most likely only answered to stimuli on the level of private commercial enterprises, not primarily to stimuli from the readers.

Last but not least, the re-issue of the *Synopsis* is also a minor moment in the history of science, and it should also be understood in the context of the circulation of Western mathematics. It seems somewhat remarkable that a mathematical textbook composed in the 1670s and published in 1685 was reissued without any change in 1729, implying the abnegation of every development in the field in the meantime, neglecting, for instance, Isaac Newton's publications. For the time being, I can explain this only by referring to the explicitly elementary level of the book, and its intention to offer only a practical introduction to pupils who were mere beginners in the field.

5. The reception: diffusion of the two issues

In order to find out to what extent this textbook reached its particular public and achieved its aims, I will investigate the known copies preserved or mentioned in historical catalogues.[150] The guiding or structuring questions for this investigation concern the number of different copies preserved or traceable, their geographical spread, the identification of their users or owners, and the traces of their having been used by readers. The basic data for this research was traced through a web of online-catalogues of actual libraries (such as Worldcat; KVK and PICA), combined with random checks of historical library catalogues of 'strategic' Jesuit colleges, printed auction catalogues of the libraries of SJ colleges after the Suppression and private collections,[151] and some other manuscript inventories.

The number of traced copies (extant or lost) for which I have information is thirty-six. Without comparative data for similar, contemporary editions, such as Schott's or de Chales's *Cursus Mathematicus,* we lack a criterion to assess its relative success. Within the same genre and period, however, one

[150] Two slightly different titles, which almost certainly correspond to copies of the same *Synopsis,* are: (a) a *Cursus mathematicus* by Thomas, mentioned in the library catalogue of Jean-François Foucquet (Golvers (2010b), p. 279); and (b) a *Synopsis Geographica et Mathematica* under the name of Thomas, mentioned in the eighteenth century catalogue of the former Jesuit library of Cordoba (Argentina; see Appendix no. 30). Most probably both titles are either informal variants, or substitute titles for two copies from which the title page was missing. For both assumptions we have sufficient parallel examples in the evidence on Jesuit libraries in the missions.

[151] See the data collected by A. Labarre (1682), p. 479 (no. 2611).

could tentatively compare these thirty-six copies to the eighty-two copies I could trace of F. Verbiest's *Astronomia Europaea* (Dillingen, 1687),[152] though for the latter we do not know the size of the print run either. Other relevant comparisons could be made with Clavius's and Tacquet's treatises, but to my knowledge these data are not available either.

An integrated diachronic reading of the *geographical spread* of the known copies—each described in the Appendix below—reveals an undeniable concentration in Northern France and the adjacent part of Belgium, with centers in those sites that had Jesuit residences in the seventeenth century: Douai, with three copies (including one from an unspecified Jesuit College (no. 4), another from the *Collège d'Anchin* (no. 5), and one in the College of the Scottish Jesuits (no. 13, now in Edinburgh)), Lille (no. 6), Bergues (no. 7); Watten (no. 10), Liège (no. 9), and Namur (no. 29), all centers of the former Gallo-Belgica Province. A member of the de Baillencourt family, who lived in southern Belgium also owned a copy, no. 8, in 1697. The Jesuit colleges of Reims (no. 12) and Pont-à-Mousson (no. 1, now in BnF) were both in the Jesuit Province of Champagne. Paris is represented by a copy (no. 2) presently in the *Bibliothèque Mazarine*, but originally owned by an (ex-) Oratorian, who presented it to the Benedictine *Blancs-Manteaux*, and a copy (no. 14) of the Jesuit college in Paris, now in Munich. A copy (no. 24) was also distributed from the Paris missions procurator office by Antoine Verjus, SJ, (1632-1706), the missions' procurator in Paris, and presented to Francesco Maria Spinola, SJ, (1654-1694) before he left for China, and another (no. 35) from the same source was brought by Jean-François Foucquet to Beijing.[153] From the adjacent Flandro-Belgica Province, we know of only the copy at Ghent (no. 28), and another (no. 10) that came to rest in the Augustinian college. From the same area we may also identify the copies acquired at the end of the eighteenth century by the bookseller W. Kuypers in Leuven (no. 33) and the scholar Jacob Goethals-Vercruysse in Kortrijk (no. 32).

Beyond this geographical epicenter—with copies being distributed from Douai to places conducting mathematical instruction of a particular level—some other copies include: no. 15 (Xanten—an unexpected and unexplained presence in North-Rhine Westphalia); nos. 16 & 17, both, more relevantly, from Lisbon, the latter from the *Colégio de Santo Antão,* center of (Jesuit) mathematical and navigational teaching (no. 17),[154] the former from an unidentified private owner Valente (no. 16); the copies José Soares, SJ, (1656-1736) (no. 25) and Thomas himself (no. 36) used in Beijing, most probably sent from the Lisbon procuratorate; a copy from the *Colégio das Artes* in

[152] Golvers (2003), pp. 412-436.

[153] On Foucquet's personal library in Beijing (Beitang), see Golvers (2010b), pp. 249-280.

[154] See in short Leitão (2007a).

Coimbra (no. 18), which circulated in its appropriate milieu, for which it was composed, that is, the preparatory mathematical classes for Jesuit candidates for the China mission;[155] and finally no. 19, from Madrid's *Collegio Imperial*.[156]

Even further afield, two copies were kept in the Jesuit collections in South America, namely in Santiago de Chile (no. 23) and Cordoba (no. 30), while the British copies (now in London and Edinburgh) stem from the continent. I was unable to get any information on the provenance of the two copies in North American libraries.

On the other hand, the apparent complete absence of copies (and testimonies) from the Italian Jesuit colleges, including the *Collegio Romano,* is quite revealing,[157] even though the historical treasures of the Italian libraries are relatively accessible online (opac.sbn.it); a copy of unknown provenance has been kept in Brescia since ca 1950 (no. 20). So long as this is not due to incomplete information gathering on our part, this lack should probably be ascribed to poor circulation of books from France to Italy. The same is the case for the German Libraries: KVK lists only the copy kept in Munich (no. 14) (it does not mention the 'peripheral' copy from Xanten (no. 15)) which stems from the Paris Jesuits, this despite the strong mathematical culture in some Jesuit colleges of the Germania Superior Province (e.g. Ingolstadt) and lively interest in the Jesuit mission to China in this province. The reason is probably that it was replaced by the similar and slightly older *Cursus mathematicus* (1661) by Kaspar Schott, printed in Würzburg. The Netherlands and the United Kingdom are also absent in this landscape: the copy in the British Library (no. 11) was originally owned by John Maynard, 'alias' of the English Jesuit John Cuffaut, and was in all probability acquired at the end of the seventeenth century on the continent, either in the English Jesuit college in Liège or in Ghent. It appears, after all, that the spread of the known copies is limited to Catholic Countries, and we have no sure indication of its reception beyond them.[158]

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[155] On the mathematical culture of this college, see Baldini (2004).

[156] For the mathematical culture in the Madrid colleges and the position of it in the *Collegio San Isidro*, see, among others Sarralle (1957), pp. 421-438; on its library, see Miguel Alonso (1996).

[157] There is no mention in the ancient catalogues of the *Collegio Romano*, especially not in Ant. Cat. 21, neither sub 21/13 (*Mathematici*) nor sub 21/27 ('*Philosophi. Mathematici S.I.*'). In principle it cannot be wholly excluded, however, that a copy was present in one of the 'specialized' collections connected to a particular chair, the books of which were not included in the catalogues of the general collection ('*Bibliotheca secreta*'). On the other hand, though, this is again improbable, in view of the fact that in other colleges the item was kept in the 'Public' (or general, i.e. not specialized) collections.

[158] I wonder therefore, whether it is by pure chance that the title, despite the many mathematical domains it covers, is not mentioned for instance by G.W. Leibniz in his

When seen from the point of view of the readers and private owners, we have to distinguish between the 'college' or 'library' copies, and those that were once private property.

With regard to the library copies, their presence in the college libraries (especially those of Coimbra, Douai, Ghent, Liège, Lisbon, Namur, Paris, Pont-à-Mousson and Reims) suggests they were integrated into the local mathematical teaching. Some copies, such as those from Coimbra (no. 18) and the *Colégio de Santo Antão* (no. 17), were kept in the local *Livraria publica*, or *Bibiotheca major* (as in the Jesuit college of Liège: no. 9), both referring to the 'general' library, which was accessible to the students. This matches the positive assessment of Ignacio Monteiro, one of the most prominent mathematicians in Portugal of his time. In his *Compendio dos elementos de matemática*, he recommends the *Synopsis* as one of the three books to be read by young Jesuit pupils for the principles of 'physics' they contain, together with the *Compendium Elementorum* by Christian Wolff (1713-1715) and Regnault's *Entretiens Mathématiques* (1743).[159] Monteiro's opinion may also explain why the book was integrated into the library of the newly established *Colégio dos Nobres* in Lisbon in 1761. Explicit links with the instruction may appear also in the copy once owned by a student of logic of some college's lower class in Ghent (no. 10), and the one from the *Reales*

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letter on the *Bibliotheca Universalis* of 1689-1690, as he did for de Chales and Schott; Leibniz (1970), p. 442 ff.

[159] Cf. Monteiro (1754), pp. 10-11: "The major part of the 'intellectuals' (the 'curiosi') want to be philosophers without studying mathematics, and of this they want to know only the principles, necessary for physics (...). It is especially for this class of people, which is very numerous and deserves to be treated with respect, that I am writing these 'Elementos'; however, if they would not find in them sufficient principles for the target they have before their eyes, they could refer to some of the many authors who wrote (about) mathematical principles adapted for the use by philosophers. From those whom I have read myself I am especially pleased by Father Antonio Thomaz, learned missionary in China, *Synopsis Mathematica*, 2 vols, in-8° (..). From all these I recommend in the first place Father Antonio Thomaz, Wolfio (i.e. Christian Wolff) and (Noël) Regnault." (*A maior parte dos curiozos dezejão ser philosophos sem estudar Mathematica, e deste so pertendem saber os principios necessarios para a physica. (…) para esta classe de gente, que he muito numeroza e merece ser attendida com respeito escrevo principalmente estos Elementos; se nelles porèm não acharem os principios sufficientes para o fim que se proponem, poderão recorrer a alguns authores dos muitos, que tem escrito principios mathematicos accomodados para o uzo dos philosophos. Dos que tenho lido me aggradão principalmente o P[adre] Antonio Thomaz, dotto misionario jesuita, Synopsis mathematica, 2 vol., em 8 (…). De todos estes aconselho em primeiro lugar o P[adr]e Antonio Thomaz, Wolfio e Regnault*.) Monteiro (1724-1812) taught mathematics at the Coimbra College from 1752 to 1756 (see Baldini (2004), pp. 459 ff.); the copy of the *Synopsis* that he read is in all likelihood still extant (see no. 18) (see Rosendo (1996), pp. 100, 111 and 116; Rosendo (1998), pp. 350-351).

Estudios San Isidro in Madrid (no. 19). It may be revealing also that in Paris the *Collège de Clermont* had a copy (no. 14), while it was absent from the *Maison Professe*. As a 'general' or 'introductory' book, it was not in the specialized collection of the professor of mathematics. Except for this data, we have so far no external testimony to the precise circumstances in which this text was actively used.

As for the copies signed by individual users, we have a small series of individual names attached to several copies, which can refer either to private readers or collectors. The former may be expected to have used it for their personal study, their path of extra-curricular preparation to a successful application for the China mission, as Thomas himself did and Monteiro repeated in 1754. The work was particularly adapted to such individual study, as evinced by its clear, didactic structure, its *Index Rerum*, the illustrations (with references from the text), and its many references for further reading. Among these private readers are the following: Francesco Maria Spinola (1687; no. 24), Thomas himself (1688; no. 36), de Baillencourt (1697; no. 8); Peter van Resseghem (1697; no. 10), the Flemish Jesuit Willem Vander Beken (1659-1702), who took a copy to China (no. 25),[160] and John Cuffaut (no. 11), both in the 1690s; the (ex-Oratorian) priest Pierre-Jean Gentil (end seventeenth to eighteenth century) owned a copy until 1703 (no. 2);[161] José Soares—who had been Thomas's student in Coimbra—received a copy in China (no. 25); before 1720 Jean-François Foucquet owned a copy, which he left in Beijing (no. 35); after 1729 Frans Corneel Cuypers de Rymenam, a Flemish nobleman with a rich *Museum*, first in Mechelen, later in Brussels, owned a copy of the re-issue (no. 31).[162] Further readers were

[160] Dehergne (1973), p. 282; on his books, see Golvers (2012-2015) vol. 2, pp. 298-299.

[161] His mathematical interests emerge from the composition of his library, where various '*Theses mathematicae*' (1684; 1688; 1694; 1695), mostly protected in the 'Room of the Oratorian Priests' ('*Salle des prêtres de l'Oratoire*'), works on geometry and horologiography, military architecture, measuring instruments and issues of the *Journal des Sçavans*. He bequeathed his books to the *Blancs-Manteaux* in Paris.

[162] In early modern Europe, a *Museum* or *Kunstkammer* was a collection of natural and artistic 'marvels' (*mirabilia*) and scientific instruments. On this family and its collections, see especially Muyldermans (1925), p. 149 ff. His *Museum* also contained a considerable series of (hardly identifiable) Chinese texts, documents and artefacts related to the Jesuit mission in China: see the list in KBR, Manuscrits, Gérard, Ms. IV.101, f. 110r.-v. To this list one should add one identifiable extant item, a copy of Giulio Aleni's *Tian zhu jiang sheng chu xiang jing jie* 天主降生出像經解, from the Douce collection, now in the Bodleian Libary in Oxford (d6), with a manuscript note by François Noël as well as the owner's mark of Count Cuypers de Rymenam; see Duyvendak (1938), pp. 229-230. According to Gérard's note mentioned above, the

Paul Weyland, SJ—the only one who is directly known from a list of readers (Liège, mid-eighteenth century), and the undated (and unidentified) José André Valente in Lisbon, in all probability not a Jesuit (no. 16).[163]

Among the identified copies, some have a link with the China mission, through their owners Antoine Thomas, José Soares, Jean-François Foucquet, Francesco Maria Spinola and Willem Vander Beken. An indirect link could be concealed in the copy of Pont-à-Mousson (no. 1).

A conspicuous group among the identified copies are the four linked to the English-Scottish colleges on the continent (Douai, Ghent (2 copies) and Watten), though these colleges sent almost no Jesuits to China.[164] This suggests that the *Synopsis* was also used as a mathematical textbook outside of the China-bound circuit. This second 'career' of the textbook apparently started with the acquisition in 1697 of a copy by de Baillencourt (no. 8). This 'secondary' use could explain also why some copies arrived in the West Indies, even when it is possible that it was owned by a Jesuit originally bound for China, but whose destination was afterwards changed.[165] In other cases, a link with the China mission can only be uncovered through prosopographical research (no. 1).

In geographical terms the private readers show a clear concentration in and around Douai, and a strong Jesuit profile, with a modest 'impact' beyond: Pierre-Jean Gentil and the Benedictines in Paris (no. 2); the Capuchins of Pont-à-Mousson (no. 1); the Augustinians in Ghent (no. 10), José Valente (no. 16); and the private copies mentioned below. The real use they made of this treatise could in principle be seen from material traces, such as underlining, marginal or interlinear annotations and the like. As far as our information goes, these are absent from the extant copies. This is hardly a surprise for library copies, as library rules strictly prohibited users from writing in books. Yet the reported worn condition of the original

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origin of this collection should be sought in the Mechelen-born Jesuit Philippe Couplet.

[163] The absence of a copy among the mathematical books in the private library of the Duchess of Aveiro, the sponsor of the entire printing process, is striking (for its inventory, see supra note 141).

[164] The main exception I know of is George Keynes, who left the English Jesuit college in Liège in 1654 to accompany Martino Martini to China, but died on the way (Dehergne (1973), p.135 and Golvers (2010a)).

[165] This happened for instance with Pieter van Hamme, of the Flemish-Belgian Province and—more relevant here—with Ignace Chomé, SJ, (1696-1768), who was born in Douai, and after long preparations for the China mission, including a particular study of mathematics and of Chinese, was unexpectedly sent in 1729 to Buenos Aires and Paraguay, where he was known as a dialectologist and mathematician: see on him Delattre (1949-57), s.v. Douai, col. 251; R. Limouzin-Lamothe (1959), col. 1241-1242.

Coimbra copy (no. 18) speaks to its repeated use, most probably due to intense consultation—over years—within the College's Public Library. Neither do the private copies have any trace of being used, as far as I could verify.

Later collectors were probably less interested in the contents, and they are no longer relevant for the answer to our question on the reception of this textbook. This holds true for the French Orientalist Etienne-Marc Quatremère (1782-1857), once owner of no. 14; the French genealogist René Aubron (1736-1814), owner of a now lost copy (no. 34); Jacob Goethals-Vercruysse (1759-1828), a Flemish local historian in Kortrijk (owner of no. 32, now lost); and Willem Kuypers (d. 1802), bookseller in Leuven between 1777 and 1783 (no. 33). All four established their libraries at a time when the book market abounded in works confiscated from suppressed ecclesiastical congregations and institutions, including the Jesuit collections. Later we find John Thomas Graves (1806-1870), an Irish mathematician (no. 12); Alfred Hamy (1834-1904), a French Jesuit historian (no. 3); Björn Löwendahl (1943-2013), a Swedish antiquarian with great interest in Far Eastern history, including the China mission (no. 26), and A. Bush (no. 21).

Concluding observations

From the outset, while still in Douai (and thus uninfluenced by Verbiest's circular letter of 1678), Antoine Thomas conceived of the *Synopsis* as a unified work in which fifteen different mathematical disciplines were presented—albeit in an unbalanced way—as leading towards astronomy. This prominent position of astronomy as the ultimate mathematical science reflects the situation in China. It corresponds perfectly to Verbiest's allegorical presentation of 'Lady Astronomy' as the leading European Muse. There are other convergences, too, all the more remarkable as for chronological reasons there can have been no direct influence of the latter on the former.

Thomas's explicit target audience was the Jesuit candidates for the (East or West) Indies' mission, mostly mathematical beginners, who needed a minimal preparation in mathematics both to support their application for the China mission in order to be successful, and to be useful on the ground when they arrived at the mission. As a didactic textbook for 'advanced beginners', it was not a specialized book, and as such was not reviewed in scholarly journals. In addition, it was shelved more than once in the general library of the colleges in order to be accessible to the students. As a result of its overall aim, this text, together with the abundant sources the author used and the books he recommended for further reading, teaches us much about what was the minimal or average level of mathematical knowledge and

skills expected from a candidate for the China mission in the last decades of the seventeenth century. De Chales's *Cursus Mathematicus*, rather than its slightly older counterpart by Kaspar Schott, was a recurrent guide and reference book for Thomas.

Despite its clear aims and general comprehensiveness, and a new issue in 1729, a broad census of copies resulted in thirty-six (both extant and lost) on which I have found information, that is, thirty-three from the first issue, and three from the second. Although the book aimed at all potential candidates for the China mission in European colleges, the known readers and owners mostly can be dated to within the three first decades after 1685, while the library copies display a rather limited spread, mainly confined to the Franco-Belgian area, with some historically-speaking relevant exceptions elsewhere in Europe (in the colleges of Paris, Coimbra and Lisbon), South America and China itself. It is possible that the focus of this textbook—which could easily make it a popular private book—resulted in the fact that many copies followed 'hidden' routes and have been lost. It is probably because of its strong and explicit link with the Catholic mission that the *Synopsis* also did not cross confessional borders within Europe.

Appendix: Census of identified copies

1. 1. Extant copies

1.1. First issue (Douai, 1685)

There are twenty-six extant copies, some of which have an interesting provenance.

In Europe

France

1. Paris, BnF (1685; 2 vols.; call number 8° V 27036/ 1 and /2): The provenance is indicated by handwritten library marks, in both volumes: in vol. 1: '*Capucinorum Mussiponti 1773* and *Collegii Mussipontani Soc[ietatis] Jesu*' and in vol. 2: '*Capucinorum Mussiponti 1773,* and in the title page: *Collegii Mussipontani Societ[atis] Jesu Catalog[o] inscript[us]*'; while the two references to the Capuchins are written in the same hand, the two Jesuit inscriptions are in a different hand, as if vol. 1 and 2 were not accessioned at once, by the same librarian: perhaps the volumes were acquired at different times? At any rate, this 2-vol. copy was originally part of the general library of the Jesuit college of Pont-à-Mousson (Lorraine).[166] This college may have given special attention to Jesuit mathematics in the China mission and the mathematical preparation of future mission candidates, since in the academic years 1697-1698 and 1699-1700 mathematics was taught by Paul-Vincent du Tartre, apparently a relative (brother?) of Pierre-Vincent du Tartre (b. 1669 in Pont-à-Mousson, d. 1724), a French Jesuit who lived in Beijing from 1701 to 1724.[167]After this college was closed in August 1768 and the last mathematics teacher (Mathieu Baliguet) left, the two volumes finally arrived in 1773 (after a public auction?) in the library of the nearby Capuchin monastery.
2. Paris, *Bibliothèque Mazarine* (8° 53701): before the French Revolution the volume was in the library of the Paris monastery of the *Blancs-Manteaux*: cf. the inscription on the title page of each of the two volumes: '*Monast[erii] B[eatae] M[ariae] Albamantellorum Ord[inis] S[ancti]*

[166] For mathematical instruction in this college, see Delattre (1949-1957), s.v. col. 138/9, and for the period before 1640, Romano (1999), pp. 543-546; see further Fischer (1983), p. 63.

[167] See Dehergne (1973), p. 823 and Fischer (1983), p. 63.

Bened[icti] Congreg[ationis] S[ancti] Mauri';[168] this monastery was in the present rue des Blanc-Manteaux. This library inscription is accompanied—and chronologically preceded—by a donation inscription: '*Ex dono D[omini] P[etri] Joan[nis] Gentil 1703*'; this refers to the first owner, the (ex-)Oratorian priest Pierre-Jean Gentil, who presented many books to the *Blancs-Manteaux*.[169]

3. Paris: *Centre Sèvres*: 2 vols. This copy has the stamp of the private collection of the Jesuit historian Alfred Hamy, SJ, (1838-1904) (*Bibliotheca / Historica / A[lfred] Hamy*); in 1906 his library was incorporated into the Jesuit library of Enghien, to which an extant label refers (*Bibliotheca S[ocietatis] J[esu] / Maison Saint-Augustin / Enghien / C 423/3a*); in 1957, the item arrived, with the rest of the library at the *Bibliothèque des Fontaines* in Chantilly, from where it was transferred to the *Centre Sèvres*. From an older period stems a budgetary remark: '*Constat fl(orenis) I-10-'*, which seems to refer—by the currency used—to a provenance outside France, for instance from Belgium.[170]
4. Douai, *Bibliothèque Marceline Desbordes-Valmore* (before: *Municipale)* X 1685/1): this copy has no written provenance indications, but it has a library mark from the French First Republic (1792-1804). From this one may safely assume it had previously been part of the collections of one of the former Jesuit colleges in Douai, which had a special connection with Antoine Thomas, an alumnus.[171] For two other copies, once in the libraries of the same city, but now in other locations, see below, nos. 5 and 13.
5. Hesdin, *Bibliothèque Historique* (F. 16.2039): the item in question has an inscription '*ex bibliotheca Aquicinctinâ*',[172] referring to the library of the

[168] On this monastery and its library, see Cottineau (1935); Franklin (1870), pp. 359-364.

[169] Franklin (1870), p. 361 (who refers to a donation in 1713, and inscriptions of another type, viz. '*Ex dono D(omini) Gentil, 1713*.' See BnF, Ms. Fr. 25672-25679: '*Observations différentes ou extraits de plusieurs livres qui ont passé par mes mains*', par Gentil (1689-1713).

[170] Based on information kindly provided by Jacqueline Diot (Centre Sèvres, Paris).

[171] Information kindly provided by P.-J. Lamblin, *Conservateur général* and *Directeur* of this Bibliothèque (11 August 2010). For historical references, see Rivière (1897); Simonin (1890), p. 307. On instruction in the Douai college of Anchin, see Delattre (1949-1957), s.v. Douai, col. 173 ff., and Dehon (1988), pp. 95-96; on the misadventures of the *Bibliothèque Municipale*, after the fusion of the Jesuit libraries in the period of the Revolution, see Delattre (1949-1957), s.v. Douai, col. 251 ff.

[172] Kind communication of J. Froissart of the same library.

former *Collège d'Anchin*, one of the largest colleges in Douai. This was also the college in which Thomas himself was a pupil, and afterwards a professor of philosophy until in 1677 he left Douai for Coimbra and afterwards for China.[173]

6. Lille, *Bibliothèque Municipale / Médiathèque Jean Lévy* (SA 1167; now 85671): this 2 vol. copy only has the stamp of the former collection of the *Chapitre de la Collégiale Saint-Pierre* in Lille. There are no other indications of a more precise provenance, but a provenance from the local Jesuits is—in view of the small number of items from the former Jesuit library—not very probable.[174]
7. Bergues, *Bibliothèque Municipale* (R. 136): according to my information, this volume has no particular physical characteristics, nor any (written) indication of its provenance. Not mentioned in the auction records for the local Jesuit college.[175]

Belgium

8. Namur: *Bibliothèque Universitaire Moretus Plantin / Centre de Recherches Religieuses* (1e vol. 1685, 2nd vol. is lacking): according to a double book inscription, this single vol. belonged to one Mr. de Baillencourt from 1697 (and again in 1698) (*Ce livre est à M[onsieu]r de Baillencourt Anno 1697 (...) 1698*).[176] As the complete old collection of the *Collège philosophique* of the Jesuits in Heverlee (Leuven)—the origin of the collection now in Namur—was destroyed in 1940, these items will have entered the collection during the second part of the twentieth century, so that the connection of this copy with the Jesuit library in Namur is

[173] For reference to the copy, see Labarre (1982), no. 2611. On the *Collège d'Anchin*, see Delattre (1949-1957), vol. 2, col. 173-262, and the old library catalogue in Douai, BM, ms. 1065 etc. 1067). Cf. Beylard (1958), p. 41. I know nothing of the circumstances in which this Douai copy arrived in Hesdin.

[174] Mentioned by Labarre (1982), no. 2611. For verification of a possible provenance from the Jesuit college (a hypothesis all the more attractive because the Lille college was the last residence of the China Jesuit François Noël: see Delattre (1949-1957), vol. 2, s.v. Lille, col. 1291-1292) one could check the ancient Inventory of the Jesuit Library, preserved in Cambrai (Ms. no. 915): *Bibliothecae Collegii Societatis Jesu Insulensis Tomus IV*, -in fol. (described by Le Glay (1848), pp. XII-XIII: cf. also Sommervogel (1893), col. 1831 ff., s.v. Lille).

[175] Copy mentioned in Labarre (1982), no. 2611. On the Jesuit college of Bergues, see Delattre (1949-1957), vol. 1, col. 634. However, the volume is not mentioned in the *Catalogue des livres composant la bibliothèque de Bergues* (Dunkerque: Imprimerie de Van Wormhout, 1842), although this has a nice collection of books on science and mathematics.

[176] Kindly communicated by Miss Céline Van Hoorebeeck.

only recent. Although this name was (and is still) not uncommon in southern Belgium and northern France,[177] it is hard to arrive at a plausible identification. De Baillencourt was probably a skilled mathematician, as his name appears in another mathematical book, Jacques Ozanam's *Cours de mathématique... la mécanique & la perspective. 4e (?) partie* (Paris: Jombert, 1693).[178] He may have been a member of the family de Baillencourt, *prévôts* in the nearby city of Mons (capital of Hainaut).[179] On this assumption, Pierre-Charles de Baillencourt (1662-1705) is the most probable candidate, but I have no information on his possible relations with the Jesuits, or his personal library.[180] Although this copy is not representative for the holdings of the old Jesuit College in Namur—Thomas's birthplace—the pre-Suppression college did own a copy of its former student's book, on which see infra, no. 29.

9. Liège: *Bibliothèque Universitaire* (shelf number: 19814 A): the now incomplete copy (only vol. 1) has a manuscript library mark: '*Collegii Societatis Jesu Leodii [catalogo inscriptus]*', referring to the college of the 'Walloon' Jesuits of the Gallo-Belgica Province, to be distinguished from that of the English Jesuits, with a college in the same city. This copy was originally complete, witnessed by a manuscript annotation in the *Catalogus Cognominum Alphabeticus Bibliothecae Majoris Societatis Jesu Leodii* (call number: 3.0.27 and 28), f. 246r. One of the users (ibid., f. 3r.) in the middle of the eighteenth century was Father Paulus Weyland.[181] The two volumes were part of a much larger collection of books that he had taken out from the general library and accumulated in his room, for reasons so far unclear; see the list of books he had borrowed in the manuscript *Catalogus librorum commodatorum ex Bibliotheca Majori Societatis Jesu Leodiensis* (ms. 91c), f. 90v. *CCC Classis LI Tab. XI: Mathematici*: '*(...) Ant[onii] Thomae, Synopsis Mathematicae, 2 vol*.' At any rate, from the *Catalogus Bibliothecae Majoris. Liber Majoris Bibliothecae / ad*

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[177] Probably related to François de Baillencourt (1610-1681), bishop of Bruges (since 1671), who had an important library, but as he died in 1681, i.e. before the *Synopsis* was printed, he is ruled out.

[178] This copy was sold a few years ago by the Librairie au Vieux Quartier-Antiquariat in Namur (http://www.vieuxquartier.net; accessed in 2015); at the time I noted this information from their catalogue, which is no longer available.

[179] On which see, among others, Dansaert (1942).

[180] With regard to the Douai-bound history of the *Synopsis*, it may be also interesting to know that several members of de Baillencourt family studied at Douai University (Delattre (1949-1957), s.v. Douai, col. 204).

[181] Paulus Weiland (Weyland, Weylandt, etc.) (Dalhem 1694—after 1773) (PIBA, II, p. 432; Guérin (1999), vol. 2, p. 599).

inscribendos libros qui ad cubicula efferuntur (Ms. 91c), it appears he did so after 1747 (the date of the most recent title mentioned), and this not in a mathematical context, as none of the other works have anything to do with mathematics. After the French Revolution, this Jesuit college became an Episcopal College, called *Grand Collège en Isle*; the books were transferred to the newly established *Ecole Centrale du Département de l'Ourthe*, and from there to the newly established state university of Liège (1817), where they remain.[182]

10. Ghent: University Library, Ma 553: the first volume of this two-volume copy has a label with an inscription: '*Bibliothecae Augustinianae / Gandensis 1700*, and *Bib[liotheca] Maj[or]- Watt. / Soc[ietatis] JESU*' (cancelled); the 2nd volume has the following: '*Bibliothecae Augustin[ianae] Gandensis 1751*'.[183] The different dates probably mean that the two volumes were acquired at a different times. The cancelled inscription of the first volume may refer to the Jesuit novitiate of Watten (Flanders, now Northern France).[184] According to a handwritten ex-libris on the end leaf of the second volume, the first owner of this volume (which seems to have entered the collection separately and much later than the first one) was one Peter van Resseghem, as mentioned above: '*Ex libris Petri van Resseghem / logici scholae inferioris / 24â Aprilis / A[nn]° 1697*'. This refers to a student (or perhaps a teacher) of the lower form of higher education, one that precedes the level of physics. This type of instruction was organized either at the universities or by religious institutions, especially the Jesuits and the Augustinians.

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[182] Information kindly provided by F. Vanhoorne (mail of 20 August 2010); the copy of the Liège university library is mentioned in Sauvenier-Goffin (1958), no. 752 and G. Grassi (1989), p. 686. For the ancient manuscript inventory, preserved in the University Library, see C. Opsomer, in *Florilège du livre en Principauté de Liège*, p. 501.

[183] Cf. Grootaers and Mees (1996); on their public instruction, ibid., pp. 95-96 (mathematics only since the end of the eighteenth century). The presence of this book is to be checked in the ms. *Catalogus Librorum Bibliothecae Augustinorum Gandensis Renovatus Anno 1763* (Ghent: St. Stephanus).

[184] '*Watt.*', on the place reserved in the inscriptions for a toponym, could be read as '*Watt(ensis)'*, the usual derivation of the place name Watten (N. France), referring then to the English Jesuit novitiate in the same place (founded in 1612). This assumption is the more attractive, as in the 1680s—when the book was published in nearby Douai—the responsible rector was John Clare (alias J. Warner-Clare, 1640-1705). He, apparently, had some interest in the China mission and the Flemish Jesuits involved in it, as in Beijing is preserved a copy of *Bresve Narration de la mort des huit pères Anglois de la Compagnie de Jésus* (on the Jesuit martyrs of England), with a personal dedication to Ferdinand Verbiest in Beijing, dated '*Parisiis Jan[uarii] 24 1684*'): see Golvers (2012-2015), vol. 1, pp. 302-303.

At any rate, he must have been a young student or scholar. As far as I could check, Van Resseghem's name is registered neither in the Jesuit (PIBA) nor in the Augustinian prosopography.[185]

Copy no. 11 below was available at the Jesuit college of Ghent before the Suppression.

United Kingdom

11. London: British Library (BL): call number 8532aaa21. One undated book inscription, in what looks like an eighteenth century hand refers to *Soc[ius] J[ohannes] Maynard*.[186] This owner's name may correspond to John Maynard, *alias* of the Hampshire born Jesuit John Cuffaut, also Cuffaud (b. 1668; professed 1688; ordained 1697, d. 1716 in Chester). As he received his education on the continent, following the courses at the college of the English Jesuits in Liège (philosophy in 1691-1693 and theology in 1696), and afterwards as a tertian in Ghent.[187] It is certainly there that he became acquainted with Thomas's *Synopsis*, as the English Jesuits of Ghent had a copy of it (no. 28). No further information on his activities, scholarly or pastoral, is known so far.
12. University College London (UCL): shelfmark GRAVES 141.b.27 and 28. It was part of the private collection of John Thomas Graves (1806-1870), an Irish jurist and mathematician, who bequeathed his magnificent mathematical library to UCL in 1870.[188] The first owner, however, appears from an inscription on the title-page: *'Collegii Remensis Societatis Jesu inscriptus 1691'*, which is the Jesuit college of Reims in northern France.[189]

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[185] Cf. PIBA for the Jesuits, and Verkerken and Grootaers (1996) for the Augustinians. As Van Resseghem owned the book in 1697, and the same volume was accessioned into the Augustinian library only in 1757, he has nothing to do with the Augustinians.

[186] Copy of the title page inscription, which I owe to the kindness of F. Wood of the British Library.

[187] See Bellenger (1984 (1993)), pp. 52 and 221; mentioned also by Oliver (1854), p. 78; the most precise biographical data however are in Holt (1984), p. 74.

[188] For his biography, see A. Rice (2004), pp. 387-388; for the Graves collection in University College London, see Dorling (1976), pp. 307-309.

[189] Information kindly provided by S. Stead (6 August 2010). On the Jesuit college of Reims and mathematical courses organized there, see Delattre (1949-1957), vol. IV, col. 278 ff.; Romano, (1999), pp. 546-548; on the local mathematical teachers, see Fischer (1983), p. 64. When this copy was acquired in Reims the professor in charge of mathematical teaching was Antoine du Chailloux (1690-1692); cf. Fischer (1983), p. 69.

13. Edinburgh, National Library of Scotland: shelfmark BCL D 1662. Volume 2 only, from St. Mary's College, Blairs, a Catholic seminary near Aberdeen, established in 1829. The first owner, however, was the Scottish College in Douai (established in 1580, closed in 1802), witnessed by the inscription: *'Coll[egii] Scot[torum] Soc[ietatis] Jesu Duaci'*.[190]

Germany

14. Munich, *Bayerische Staatsbibliothek* (BSB): shelfmark: Math.u. 194 d1-2. This copy of the 1685 edition has a double provenance mark: (a) on the frontispieces of both volumes is written, in the same handwriting: '*Collegii Parisiensis Societatis JESU*'. This library mark is cancelled, probably on the occasion of it being accessioned into a different collection; (b) a printed ex-libris in vol. 1: *'ex Bibliotheca / Steph[ani] Quatremeri'*, that is, the French Orientalist Etienne Quatremère (1782-1857).[191] Finally the item was acquired by the BSB, in all probability on the public auction of Quatremère's library on 25 November 1858. The most interesting aspect of this itinerary is the work's original presence in the library of the Paris Jesuit college in the rue St Jacques, called until 1684 *Collège de Clermont*, and thereafter *Collège Louis-le-Grand*, to which the first ex-libris refers.[192] Since the early 1680s this college was one of the strategic European centers for the China mission, where the mission of five French Jesuits led by Jean de Fontaney who left for China in 1685 was set up. Thus the original appropriation of this volume—albeit in an unknown year—may be seen as the expression of the interest in this educational milieu both for the Jesuit mission in general, and the mathematical preparation of future candidates in particular. I suppose the acquisition was made very soon after the book appeared, as already in the late 1680s, Antoine Verjus, the procurator of the Oriental missions, had some copies on hand, one of which he presented to Francesco Maria Spinola, who left Paris in 1686 (cf. infra no. 24). The spread and reception of this title in the Jesuit milieu of Paris certainly was facilitated

[190] Information kindly provided by Dr. Anette I. Hagan, Senior Curator, Rare Book Collections of the National Library of Scotland (5 August 2010). On this college, see Dancoisne (1866-1867), pp. 260-268. For a late-eighteenth century inventory of this library, see the manuscript *Inventaire et catalogue des livres qui existaient au Séminaire des Ecossais de Douai*, mentioned in Duthilloeil (1846), no. 946.

[191] Etienne Marc Quatremère was a professor at the *Collège de France*; on the acquisition of his library by the BSB, see Rebhan (2010), pp. 199 ff.

[192] On the library marks and inscriptions in the books of the former *Collège de Clermont-Louis le Grand*, see Franklin (1870), pp. 245 ff., especially p. 262; for another bookmark, see Bouland (1919).

not only by the many bookshops on the rue St Jacques, but also by the fact Thomas was personally known there since his visits in 1677 (see notes 5 and 74). He also had a correspondent there, Alexandre de Bonmont, who was in contact with Thomas Gouye, SJ, (1650-1725), a member of the *Académie des Sciences,* who lived in the *Collège de Clermont*.[193] The fact that this copy is not mentioned in the 1764 auction catalogue of the Paris *Collège de Clermont* is consistent with the fact that the library mark has been cancelled (on the occasion of a removal prior to 1764).[194]

15. Xanten, *Stiftsbibliothek St. Viktor* (only volume 2; 3116): possibly from the former local Jesuit college.[195]

Portugal

16. Lisbon, *Biblioteca Nacional de Portugal* (call number: S.A. 2473 P). A copy in 2 vols., without any provenance indications, yet, a clear handwritten owner's mark in seventeenth or eighteenth century handwriting refers to one José André Valente (*Este livro he do P[adre?] Joseph Andre Valente*), who is still unidentified, but in all probability not a Jesuit.[196]
17. Lisbon, *Biblioteca da Ajuda*: 38 III 13: copy of volume 1. Handwritten provenance indication: '*Da livraria publica do Coll[egi]o do S[anto] Antão da Comp[anhia] de JESU.* Repeated, by another hand, as*: Livraria publica do Collegio do S[an]to Antara [sic] da Comp[anhia] de JESU*'. This copy is still mentioned in 1745 in the *Index Librorum Bibliothecae Collegii Ulyssiponensis Divi Antoni Magni Societatis Jesu* (BA 52-XI-44; see Giurgevich and Leitão (2016), p. 304). The transfer happened after this date, in all probability at the occasion of the Suppression. Perhaps it was first transferred to the library of the *Colégio dos Nobres* (est. 1761), where a two-volume copy is mentioned in the *Catalogo dos livros portuguezes [Latinos etc.] de folio [quarto, etc.] que foram parte da livraria do Real Colégio dos Nobres*, 1829 (BA).
18. Lisbon, *Biblioteca da Ajuda*: 38 III 14: copy of volume 2. Handwritten provenance indication: '*Da livraria publica do Coll[egio] de Coimbra da*

[193] On the contemporary milieu of this college, see Dupont-Ferrier (1921).

[194] See the Catalogue des livres de la bibliotheque des ci-devant soi-disans Jésuites du collége de Clermont (Paris: au Palais, chez Saugrain & Leclerc, 1764).

[195] See Föhl and Benger (1986), p. 328. On the history of this collection (in which the local Jesuit library only represents 5 to 8%), see Corsten & Feldmann (1993), pp. 369-373. Repeated enquiries on the provenance of this copy have remained unanswered.

[196] Information kindly provided by António Vasconcelos de Saldanha (16 August 2010) and Lígia Maria de Azevedo Martins of the BNP in Lisbon (1 September 2010).

Comp[anhia] de JESU'. This may be the copy mentioned in the old catalogue in ANTT, Ministério dos Negocios eclesiasticos e Justiça, Maço 61, Caixa 50, N1: '*Sinopsis matamatica [sic] dous tomos de quarto uzados*. 2' (from the *Livraria do Collegio da Companhia de Jesus de Coimbra*, 1766; L. Giurgevich and Leitão (2016), pp. 298-299). The size indication as an in-4° is certainly wrong. The copy has the inscription: '*Bibliotecas de S[ua] M[a]g[estade] Imperial*', referring to the Brazilian exile of King João VI (1807-1821).

Spain

19. Madrid: *Biblioteca Complutense: Bibl. Historica 'Marqués de Valdecilla'*: F(ondo) Antiguo BH FLL 22063 (*pars prima*) and BH Med 2623 (*pars secunda*). Both have the stamp of the '*Biblioteca de Filosofia y Letras Madrid*', and the ink shelf mark of the library of the *Reales Estudios de San Isidro*. The handwritten catalogue of the latter collection (BH MSS 588 and BH MSS 589) mentions the presence of the Thomas item in the *Collegio Imperial* as follows: '*Antonius Thomas. Synopsis Mathematica. Duac(i). Michael Meiresse [sic], 1685, 8° Pta. Vol. 2*'.[197]

Italy

No copies mentioned on opac.sbn.it, or in the online catalogue of printings of the Vatican library.

20. Yet, around 1950 a copy of the first issue was acquired by the Italian engineer Carlo Viganò (1904-1974), from an unknown provenance, and is now part of the Biblioteca di Storia delle Scienze Carlo Viganò in the Brescia campus of the Università Cattolica dal Sacro Cuore, call number: F(ondo) A(ntico) 6 C 94/1-2; See *Catalogo della Blbioteca di Scienze 'Carlo Viganò.' Fondo Antico (1482-1800) e Fondo manoscritti*, Milano: vita e Pensiero, 2994, n°4739.[198]

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[197] Information from Paz Sanchez San José (10 August 2010) and especially from Mercedes Cabello of the same library. For a selection of old mathematical works in this modern library, see the catalogue, Moreno Castillo (2006), esp. pp. 21 ff.

[198] Both the volumes of this copy have been scanned and are available online.

- Volume 1: http://atena.beic.it/view/action/nmets.do?DOCCHOICE=4728508.

xml&dvs=1496842443627~663&locale=fr_FR&search_terms=&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=&usePid1=true&usePid2=true

- Volume 2: http://atena.beic.it/view/action/nmets.do?DOCCHOICE=4729603.

Outside Europe

USA

21. Buffalo & Erie County (New York) Public Library: The presence of a copy of the *Synopsis* was recently checked and confirmed by letter by Liam Brockey. It is a copy of the issue of 1685 (Call number: RBR seventeenth century 1685 A 68). Bookplate of Addison Bush, a local collector (1906-1979). On the title plate are barely legible initials (?) 'M.P.'[199] Apparently no old Jesuit provenance.
22. New York, Columbia University Library: David Eugene Smith Collection. Copy of the 2 vols of the 1st ed., call number SMITH 500 1685 T36. The 2 vols have, on the French title pages, in clearly legible handwriting, the name of a previous owner '*De Coninck*' and (in another hand?) '*de Vidame*'. While the former refers to a Flemish context (family name De Coninck: 'the King'), '*de Vidame*' refers to a French noble title. No further information.

Chili

23. Santiago, *Biblioteca Nacional de Chile*: vol. 1, part of the *Seccion Fondo General*; Boveda 8; (303-14) c1. Part of the book collection, which was transferred in 1818 by Bernardo O'Higgins from the former local Jesuit collections and filed in the *Universidad de San Felipe*, to which were added books from the former *Colegio Maximo de San Miguel*, the *Noviciado* of Santiago and the *Colegio de San Pablo*. It thus seems that this book was part of the original Jesuit collections in South America (see also *infra*).

China

Two copies in the former Beitang collection (cf. *infra*), mentioned in Verhaeren (1949), are now kept in the Rare Books Section of the National Library of China (Beijing).

24. The copy mentioned in Verhaeren (1949), no. 2941 has in the first volume the dedication: '*P[ater] Verjus Franc[is]co M[ari]ae Spinola-Collegii Soc[ietatis] Jesu Pekini*'. It was a present from Antoine Verjus to Francesco Maria Spinola, who was a travel companion of Philippe Couplet (1623-1693). The latter left Paris for London on 7 March

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xml&dvs=1496842471950~788&locale=fr_FR&search_terms=&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=&usePid1=true&usePid2=true

(Accessed on 26 May 2017.)

[199] I owe this information to a kind communication by Miss Amy J. Pickard, Rare Book Curator.

1687.[200] In 1688 he left England by ship for Portugal and Spain. This brings the moment when the present was given (e.g. during a farewell meeting in Paris) very close to the publication date of 1685, so that this may be the oldest provenance we can trace of the *Synopsis*. The second part of the inscription refers to a later phase in the book's history, as it speaks of its being part of the (library of the) Nantang 南堂 College, the later name of the Xitang 西堂 College, with a type of inscription similar to about 250 others between ca. 1725 and ca. 1755.[201] Volume 2 of the same item has an owners mark, which refers to the Huai'an 淮安 mission, in an unspecified period: *'Da V[ice]provincia da China pertence a Igreja de Hoai Ngan',* in all probability to be connected to the arrival of Willem Vander Beken, who had several mathematical books in his mission library, and left Belgium in 1691.[202]

25. Verhaeren (1949), no. 2942 (2 vols.). Volume 1 of this copy has an inscription completely identical to that of volume 2 of no. 24 (*Da V[ice]provincia da China [.] Pertence a Igreja de Hoai Ngan*). One wonders therefore (but cannot check) whether volume 1 of Verhaeren's no. 2942 belongs with volume 2 of his no. 2941. Volume 2 of this copy has a donation formula: '*Ex dono P[at]r[i]s Joseph Suarez*', referring to José Soares, the former pupil of Thomas in Coimbra;[203]who left Portugal for China in 1680 together with him. The copy—printed in 1685—was sent to him several years later. Once in China, Soares resided in Beijing from 1688, and was rector of the Portuguese college there from 1692 to 1697. To my knowledge he was involved neither in teaching mathematics nor in the Bureau of Astronomy,[204] the motive of the acquisition, and afterwards of the donation, was probably merely piety.

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[200] Foss (1990), p. 136.

[201] See Golvers (2012-2015), vol. 2, 2013, p. 134 ff.

[202] For the connection of this inscription with Vander Beken's presence in Huai'an I rely on the inscription given in Verhaeren (1949), no. 1998: '*Da V[ice] Prov[incia] da China. Pertence à Igreja de Hoai ngan por ordem estreyta dos Superiores e todos os outros mais livros da mesma igreja*'. See further, Golvers (2012-2015), vol. 2, pp. 298-299.

[203] See Thomas on 15 September 1688: '*Jos[ephum] Suarez, meum olim Conimbricae discipulum*' (JapSin. 149, f. 508).

[204] José Soares resided in the Dongtang 東堂 for some time as the assistant of Thomas (Francesco Gemelli Careri met him there in November 1695; see Gemelli Careri (1708), vol. 4, p. 119). Some occupational work with optical instruments and the making of *vitrei lapilli* (small 'stones' of greenish glass) is mentioned in 1700 in JapSin. 148, f. 258r.

1.2. Second issue (Douai, 1729)

So far I know of only two copies of this re-issue:

26. One complete copy in the private collection of the late Björn Löwendahl (Stockholm), now in the Shanghai Municipal Library. This copy has no indications of provenance.[205]
27. One copy (volume 2 only) now kept in Lyon *Bibliothèque Municipale* (shelfmark: 346913). This copy also has no indications of provenance, but it certainly did not arrive in Lyon as part of the Chantilly Jesuit books on the occasion of their transfer to the *Bibliothèque Municipale*. Neither is there any indication that the volume might stem from the historical Jesuit colleges of Lyon (especially the *Collège Ste Trinité*), however attractive this might be, both for the mathematical courses and the connections with the China mission there.

2. 2. Evidence from historical inventories, catalogues or other sources

In addition to the evidence of the extant copies, a more systematic investigation of historical library inventories and recent auction catalogues has contributed to further refining the distribution map of pre-1776 copies. A preliminary random check on some significant sources turned out to be fruitless, in the sense that this time they provided almost no new mentions.

In libraries in Europe

Belgium

Of the old Jesuit colleges in the Belgian provinces, neither the library catalogue of the Brussels college,[206] nor that of the English Jesuits in Liège—

[205] For a description, see Löwendahl (2008), vol. 1, no. 361: Synopsis Mathematica complectens varios tractatus quos huius scientiae tyronibus et missionis Sinicae candidatis breviter et clare concinnavit, Duaci: apud Carolum Ludovicum Derbaix, 1729, 8vo, IV + 498; + IV + 530 pp. + 38 folding engraved plates. After a new check, I have improved this description as follows: (vol. 1) IV (title + index) + 474 + XIV (index, approbatio, errata) (= 488 pp.); (vol. 2) IV (title + index) / 540 + X (index, last page with errata) (= 550 pp. + plates)). The second volume of this copy lacks the appended (paginated) 'Tabula Astronomica', which is present in the Lyon copy.

[206] See the handwritten *Catalogus Bibliothecae Collegii Bruxellensis Soc(ietatis) Jesu. Prima Pars* (KBR Inv. 4685), and its section on '*Mathematici*' (pp. 715-754: ca. 550 different titles). The core of the catalogue was made in the middle of the seventeenth century, i.e. before the *Synopsis* was published. The final mathematical titles added to the finished catalogue—all in the same hand, but easily recognizable—concern books published in the 1680s, *viz*. two editions of André Tacquet from 1682 and 1683

although both had important mathematical collections—mentions a copy, contrary to that of the 'Walloon' Jesuits in Liège (cf. supra: no. 9). When switching to the—much more frequent—late eighteenth and early nineteenth century printed auction catalogues of previous Jesuit collections offered for sale after the Society's Suppression (1777-1778), the only positive evidence stems from the previous Jesuit colleges of Ghent and Namur.

28. A copy from the previous college of the English Jesuits in Ghent:[207]
29. A copy mentioned in the pre-Suppression Jesuit college of Namur.[208]

Elsewhere in Europe
Other 'strategic' points in Jesuit mathematical training with a missionary connection have proved negative as well: the Paris Professed House (opposite to the *Collège-Louis-le-Grand*);[209] the *Collège Royal de La Flèche*;[210] Prague (*Collegium Clementinum*); the *Collegio Romano* (Rome) and Ingolstadt.

In libraries outside Europe

30. Cordoba (Argentina): a copy—now apparently lost—[211] of '*P. Antonius Thomas: Synopsis Geographica et Mathematica, t. 2*' is mentioned in the *Index Librorum Bibliothecae Collegii Maximi Cordubensis Societatis Iesu* of 1757' (file 149). This is the old library of the *Colegio Maximo de la Compañia de Jesus in Cordoba* (Argentina),

(p. 717), one of Bernard Lamy of 1682 (p. 720), one of Jean-Baptiste Billot of 1679 (p. 733), and—the very last addition—one of Ignatius de Jonghe, SJ, *Geometrica Inquisitio* of 1688 (p. 733), the last Jesuit mathematician from the Flandro-Belgica province (d. 1692). No copy, however, of Thomas's 1685 *Synopsis Mathematica* was entered.

[207] *Catalogue de livres des bibliothèques du Collège des ci-devant Jésuites à Gand*, (2nd part) Bibliothèque des ci-devant jésuites Anglois de Gand, 1778, p. 36, no. 6613: '*Synopsis Mathematica*. Duaci 1685.'

[208] See the *Catalogue de livres de la bibliothèque du collège des ci-devant Jesuites de Namur* (...), Brussels, 1788 (no. 1046: '*Synopsis Mathematica*, authore Antonio Thomas, Douai, 1685, 2 vol. [together with some other works such as L'Amy (sic), *Eléments de géometrie*; Pardies, *Elements de Géometrie; Différents traités de Mathématiques*). This may prove that Thomas's work was probably not acquired for 'sentimental' reasons—as the work of a local Jesuit—but as part of a set of basic mathematical books.

[209] Catalogue de livres de la bibliothèque de la Maison Professe des ci-devant soi-disans Jésuites, Paris, 1763.

[210] See the (incomplete) printed catalogue (1777), published by Baudry (2014).

[211] According to the online catalogue of the *Biblioteca Mayor* of the *Universidad Nacional de Cordoba*.

founded in 1613.[212] The presence of this copy in this center of education—where a *Catedra de Prima de Mathematicas* was established in 1678—confirms, together with the present copy from Santiago de Chile (cf. supra, no. 23), which stems from a pre-Suppression Jesuit regional college, that the basic mathematical preparation the *Synopsis* provided was also appreciated in the South American missions, or by whomsoever finally arrived in this part of the Indies.[213]

In private collections

Belgium

31. A complete copy of the second issue (1729) was in the library of the Count Cuypers de Rymenam (cf. *supra*), originally in Mechelen, in the eighteenth century in Brussels, see the *Catalogue d'une très-belle collection de livres, en toutes sortes de classes et bien conditionnés, dont la vente se fera à la maison de la Veuve de Cuypers de Rymenam*, Brussels: Ant. D'Ours, (1802), no. 919: '*Synopsis Mathematica, per A. Thomam, Duaci, 1729, 2 Tomi, fig.*'
32. A copy of volume 1 of the first issue was in the private library of Jacob Goethals-Vercruysse (1759-1838) in Kortrijk, which since August 2015 is in the *Rijksarchief Kortrijk*, where it is apparently now lost.[214]
33. A copy of the first issue was owned by Willem Kuypers (d. 1802), bookseller in Leuven.[215] He had a splendid collection, which included incunabula, probably built up thanks to his position as head of the *Typographia Academica* of the University of Leuven from 1777 to 1783, i.e. the period in which the libraries of a number of Jesuit and other religious institutions were auctioned off.[216]

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[212] For the catalogue, see Fraschini and Sanchez (2003), p. 21. On the holdings of this library, see, among others, Quiles (1952) and Garcia Castellanos (1963). Further on the history of the collection, see Cabrera (1930).

[213] For photographs of seventheenth and eighteenth century mathematical books in the so-called *Libreria Grande* (*Colegio Maximo*, Buenos Aires), see Lewis and Morales (2002).

[214] See Catalogue des livres et manuscrits de la bibliothèque de feu Monsieur Goethals-Vercruysse, Kortrijk, 1875, p. 74, no. 30: 'Synopsis Mathematica, auct. A. Thomas, seconde partie seulement. Duaci, 1585 (sic).' For the context in which this collection was constituted, see, among others, Verstraete-Augustyn and Bauwens-De Jaegere (1988).

[215] Cf. Lesage (2006), pp. 226-227.

[216] The copy was not yet mentioned in the 1785 catalogue, Catalogus librorum in omni scientiarum et artium genere, inter quos varii rariores, quorum auctio fiet

The same title was apparently lacking, or at least was not mentioned, in a series of other relevant private historical collections in Belgium, established in the same period and from the same origin (Lammens; Van Hulthem, de la Serna; de Serrure, Vergauwen; Verdussen, Van de Velde; de la Hemptinne, Van Meldert, etc.). Neither is it mentioned in H. Vangindertael's dissertation on the presence of Western works on China in private Belgium auction catalogues of the eighteenth century.[217]

France

34. A copy is mentioned in the auction catalogue of René Aubron, presented for sale in Paris in 1840, see *Catalogue des livres anciens et modernes composant la bibliothèque de M. Aubron, ancien généalogiste*, Paris, 1840, no. 270: '*Synopsis Mathematica complectens varios tractatus, etc., auctore Ant. Thomas, Duaci, 1685, 2 vol. in-8, mar., tr.; dor., fl.*'.

China

35. A copy in the personal book collection of Jean-François Foucquet: cf. the inventory he made at his departure from Beijing in 1720, now in BAV, Borg.lat. 565, f. 593 ('*Premier supplément du catalogue livré au P. Dentrecolles par le P. Foucquet sur le point de quitter Péking, et dans lequel pour être trop pressé il omit plusieurs ouvrages. Voyez les noms de quelques uns (…): P. Ant. Thomas. Cursus mathematicus, vol. 2*'.

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publica (pecuniâ cambiali) Lovanii, in aedibus W. Kuypers, bibliopolae e regione Hallarum, Leuven (BnF LLA Q 9033). It appears in the auction catalogue made after Kuypers's death in 1802, Catalogue d'une nombreuse collection de livres rares et precieux dans tous les genres et sciences, délaissés par feu W. Kuypers, en son vivant libraire célèbre à Louvain, (Leuven, 1802), p. 130 no. 110: 'Synopsis Mathematica per Ant(onium) Thomas, duaci (sic) 1685, 2 vol. fig.' On his position at the Academic Printing Office (Academische Drukkerij) in the period 1777-1783, see Roegiers (1982), p. 152. Kuypers's private collection was consulted by P. Lambinet for his Recherches historiques, littéraires et critiques sur l'origine de l'imprimerie, Brussels, s.a. (1799), pp. 147; 153; 214; 217; 247; 253; 256; 259; 269; 271; 277-278; 293; 338; 342; 368; 426; 431. Although Lambinet also had considerable interest in Chinese xylographs (especially those in Lyon) and was acquainted with the work of the Jesuits in China (pp. 39-41), in this work he made no reference to Kuypers's books on the China mission, such as Thomas's Synopsis. The precise provenance of Kuypers's copy of the Synopsis is unknown. One could surmise that it comes from the library of the local Jesuit College, sold on 12 April 1779, but the catalogue of this auction does not mention a copy of it.

[217] Vangindertael (1985). It is, however, not certain whether this result is completely reliable, as it is possible that the title was abbreviated in the catalogue as '*Synopsis Mathematica*', and the item therefore not recognized by Vangindertael as a work in connection with the China mission.

36. The copy used by Thomas since 1688 (see supra).

In addition to these, a quick survey of the catalogues of auctions organized between 1985 and 2009 demonstrates that not a single copy of *Synopsis Mathematica* had been offered for sale during this 20-year period.[218]

[218] I base this on an overview of *L'Argus du livre de collection*, and the *Jahrbuch der Auktionspreise für Bücher*. I had no opportunity to check the *Book Auction Records* for the same period.

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Abbreviations

AFSI: Archives jésuites de la Province de France, Vanves
ANTT: Arquivo Nacional da Torre do Tombo, Lisbon
APUG: Archivum Pontificiae Universitatis Gregorianae, Rome
ARA: Algemeen Rijksarchief Antwerpen (Antwerp-Beveren)
ARSI: Archivum Romanum Societatis Iesu, Rome
BA: Biblioteca de Ajuda, Lisbon
BnF: Bibliothèque nationale de France, Paris
BSB: Bayerische Staatsbibliotheek, Munich
JA: Jesuitas na Asia (section of Biblioteca de Ajuda, Lisbon)
JapSin: Japonica Sinica (section of ARSI)
KBR: Koninklijke Bibliotheek van België / Bibliothèque Royale de Belgique, Brussels
MPM: Museum Plantin Moretus, Antwerp
PIBA: Audenaert, Willem and Herman Morlion, *Prosopographia Iesuitica Belgica Antiqua. A biographical Dictionary of the Jesuits in the Low Countries 1542-1773,* Leuven - Heverlee, 2000.

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